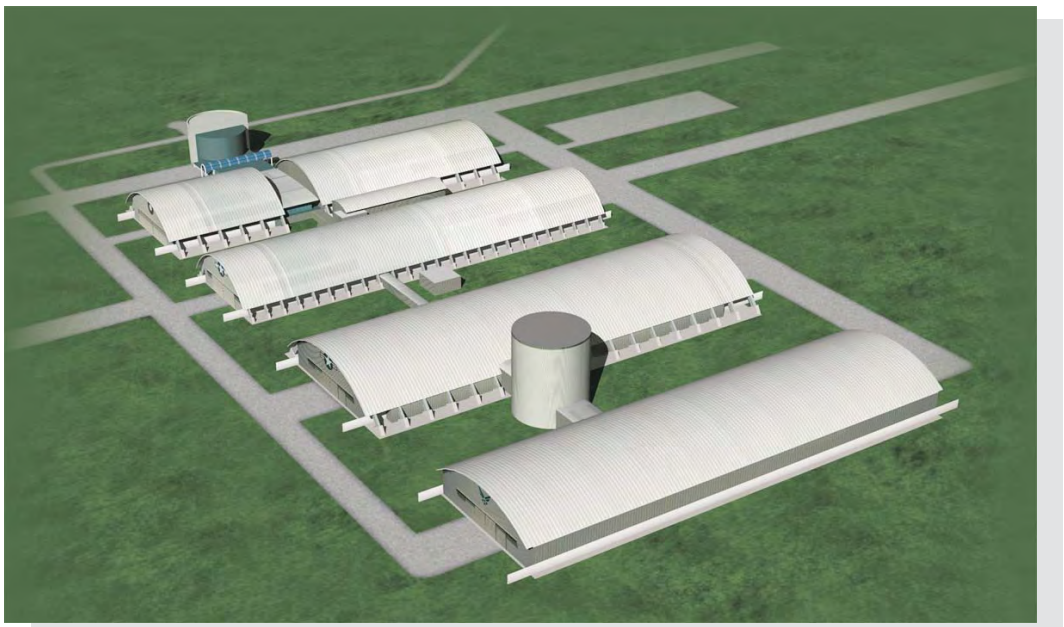
FINAL

ENVIRONMENTAL ASSESSMENT FOR THE NATIONAL MUSEUM OF THE UNITED STATES AIR FORCE ADDITION WRIGHT-PATTERSON AIR FORCE BASE, OHIO

88th AIR BASE WING



February 2013

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
26 MAR 2013	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Final Environmental Assessment for the National Museum of the United States Air Force Addition, Wright-Patterson Air Force Base, Ohio	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **United States Air Force 88th Air Base Wing Wright-Patterson Air Force Base, Ohio**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**SAR**	**205**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

FINAL
FINDING OF NO SIGNIFICANT IMPACT FOR THE NATIONAL MUSEUM OF THE UNITED STATES AIR FORCE ADDITION WRIGHT-PATTERSON AIR FORCE BASE, OHIO

February 2013

Pursuant to the Council on Environmental Quality regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA), 40 Code of Federal Regulations (CFR) 1500 - 1508, Department of Defense Directive (DoD) 6050.1 and Air Force regulation 32 CFR Part 989, the 88th Air Base Wing (ABW) Civil Engineer Directorate, Asset Management Division prepared an Environmental Assessment (EA) for the National Museum of the United States Air Force (NMUSAF) Addition, Wright-Patterson Air Force Base (WPAFB), Ohio. This EA is incorporated by reference into this finding per 40 CFR 1508.13.

Purpose and Need

The NMUSAF requires an adequate facility to display its ever-growing collection of space vehicles and other historic artifacts that depict the material history of the USAF. The material is displayed to educate the general public and to train Air Force personnel in the technical and historic heritage of their service in the USAF. The proposed 224,000 square foot addition (referred to as Hangar 4) would permit consolidation and integration of items currently on display with new acquisitions.

Description of Proposed Action

The Proposed Action consists of two parts: construction of an addition to the existing NMUSAF and its subsequent operation. The construction of Hangar 4 would be located approximately 195 feet south of existing Hangar 3 in a parallel configuration. Concrete tow lanes would extend from existing Hangar 3 tow lanes and would provide access to the doors on the east and west ends of Hangar 4. The addition would be similar to Hangar 3 in size and appearance. A connector with Hangar 3 would be constructed for the purpose of continuing the main circulation spine from Hangar 3 and connect into the north side of the Hangar 4 exhibit space. The connector would allow for circulation around the existing central stairs of the Hall of Missiles (Hangar 3) and into curved corridors that bring the circulation flow back into a single spine before entering into the proposed Hangar 4 exhibit space. Hangar 4 would be designed to support exhibits on a reinforced concrete slab-on-grade to accommodate aircraft point loads. The design of Hangar 4 would be architecturally compatible with the interior and exterior of the existing Museum.

As part of the Proposed Action, educational exhibits would be displayed that emphasize Science, Technology, Engineering, and Math (STEM) programs. Proposed exhibits would showcase Air Force technologies and would include unique characteristics in design, propulsion, payload capacity, human factors, communication, range, speed, and operating environment. A unique feature of Hangar 4 would be the creation of dedicated, interactive spaces for learning in the Presidential, Space, and Global Reach galleries. Three learning nodes would provide a unique environment for lectures and demonstrations, as well as extensions of the exhibit experience.

No-Action Alternative

Under the No Action Alternative, there would be no addition constructed to the existing NMUSAF and the museum would not have a location for the preservation and interpretation of artifacts from the space program and the air mobility mission. Visitor access to the Museum's collection of Presidential aircraft would continue to be limited due to its current location in a secure area on WPAFB. Under the No Action Alternative, the Presidential collection would continue to be accessible to less than 10 percent of Museum visitors who are escorted to the collection via bus service to and from the secure area. The mission of the NMUSAF to preserve, display, and interpret the rich history of the USAF would be compromised.

Alternatives Considered but Eliminated from Further Study

One alternative considered but eliminated involved constructing Hangar 4 approximately 1,200 feet northeast of the existing museum center in the location of adjacent baseball fields. This alternative was eliminated from further analysis because it does not meet the purpose and need of providing an adequate facility that would consolidate and integrate items currently on display with new acquisitions. A second alternative involving the construction of Hangar 4 in the tow path located adjacent to the existing museum, the adjacent airfield, and in the nearby baseball fields was eliminated from further analysis because of on-going development restrictions. Additional alternatives considered involved constructing Hangar 4 at other locations on-Base; however, these alternatives did not meet the purpose and need as any on-Base available land would require the addition to be constructed separate from the existing NMUSAF complex and/or would require the continued use of a bus service to transport visitors to another part of the Base.

Identification of Preferred Alternative

The Air Force has identified the Proposed Action as the preferred alternative. The Proposed Action involves construction of Hangar 4 adjacent to the existing NMUSAF complex resulting in an aesthetically cohesive collection of buildings to display artifacts and attract visitors. This selection was based on reasonable balance between mission requirements, facility requirements, efficient use of resources, and timeline for implementation.

Environmental Consequences

Land Use (EA Section 4.1): The preferred location is consistent with the WPAFB General Plan; a change in land use designation is not required. The No Action alternative would have no impact over current conditions.

Air Quality (EA Section 4.2): Implementation of the Proposed Action would result in minor short-term impacts from particulate matter and engine exhaust emissions generated during construction activities; impacts would be minor because emissions would be short in duration and are negligible with respect to overall emissions expected for the region. The No Action alternative would have no impact over current conditions.

Noise (EA Section 4.3): The Proposed Action would have minor short-term impacts on ambient noise generated from construction activities. Impacts would be minor because these activities would be carried out during normal working hours. The No Action alternative would have no impact over current conditions.

Soil Resources (EA Section 4.4): The Proposed Action would have short-term minor impacts to existing soils during construction activities. Impacts would be minimized by implementing Best Management Practices (BMPs) for erosion and sedimentation controls. The No Action alternative would have no impact over current conditions.

Water Resources (EA Section 4.5): The Proposed Action would result in short-term adverse impacts from surface water runoff during construction activities. Impacts would be minor because erosion and sedimentation controls would be implemented. Potential long-term impacts due to an increase in impervious surface area would be negligible because potential impacts would be addressed during the design phase. The No Action alternative would have no impact over current conditions.

Biological Resources (EA Section 4.6): The Proposed Action would result in negligible short-term impacts as the preferred location is previously disturbed with no naturally-occurring vegetation and does not provide suitable threatened and endangered species habitat. The No Action alternative would have no impact over current conditions.

Cultural and Historic Resources (EA Section 4.7): The Proposed Action would result in no impact to cultural and/or historic resources as no building demolition is proposed as part of the project and no known cultural resources exist within the footprint of the proposed project addition. Historic artifacts within the existing NMUSAF hangars would not be disturbed during construction. The No Action alternative would have no impact over current conditions.

Socioeconomic Resources (EA Section 4.8): Implementation of the Proposed Action would provide negligible, yet beneficial short-term gains to the local economy from revenue generated by construction activities. Long-term potential beneficial impact would be expected from the anticipated increase in visitors to the NMUSAF. The No Action alternative would have short- and long-term minor adverse impacts as the display of ever-growing military and space artifacts would not be available for public interpretation.

Environmental Justice (EA Section 4.9): The Proposed Action would have no impact as no change in land use would occur and there would be no short- or long-term disproportionate impacts to minority or low-income populations. The No Action alternative would have no impact over current conditions.

Transportation and Infrastructure (EA Section 4.10): The Proposed Action would have a negligible temporary impact from increased traffic during construction of the Museum addition and negligible impacts from utilities as there would be no substantial increase in personnel or facility operations. There would be minor long-term adverse impact due to increased utility costs in operating Hangar 4, which would be offset by revenue generated from the operation of Hangar 4. The No Action alternative would have no impact over current conditions.

Health and Safety (EA Section 4.11): The Proposed Action would result in potential short-term minor impacts to workers during construction activities. Impacts would be minimized by adherence to applicable safety standards. The No Action alternative would have no impact over current conditions.

Hazardous Materials/Hazardous Waste (EA Section 4.12): The Proposed Action would have a negligible impact because any hazardous materials used during construction of Hangar 4 would be temporary and would cease upon completion of Hangar 4. The No Action alternative would have no impacts over current conditions.

Agency Consultation

In accordance with NEPA, 42 U.S.C. §4321 et seq. (1969), informal consultation was solicited with applicable agencies to seek input on the likelihood of environmental or other impacts resulting from the development of the Proposed Action. A summary of the outcome of consultation efforts with pertinent agencies is included as Appendix B of the EA.

Public Notice

A public notice was posted in the *Dayton Daily News* on January 16 and January 19, 2013. One paper copy and one compact disc of the EA were made available for review at the Fairborn Library. The comment period was held from January 17, 2013 until February 15, 2013. No comments were received from the public during the comment period.

Finding of No Significant Impact (FONSI)

The Proposed Action consists of two parts: construction of an addition to the NMUSAF and its subsequent operation. Under the No Action Alternative, there would be no interpretation of the USAF's role in manned flight or military exploration of space and the prolonged outdoor display of priceless historical artifacts would continue to deteriorate. Based upon my review of the facts and analysis contained in the EA, which is hereby incorporated by reference, I conclude that the Proposed Action and the No Action Alternative would not have a significant impact on the natural or human environment. An environmental impact statement is not required for this action. This analysis fulfills the requirements of NEPA, the President's Council on Environmental Quality, and 32 CFR 989.

Date: 26 Mar 13

DAVID A. PERKINS, P.E.
Director
Civil Engineer Directorate

Final
Environmental Assessment
National Museum of the United States Air Force Addition
Wright-Patterson Air Force Base, Ohio

Contract No. FA8601-11-D-0002
Delivery Order 0017

Submitted to:

Wright-Patterson Air Force Base
88th Air Base Wing
Civil Engineer Directorate
Asset Management Division

February 2013

COVER SHEET

ENVIRONMENTAL ASSESSMENT
NATIONAL MUSEUM OF THE UNITED STATES AIR FORCE ADDITION
AT WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Responsible Agencies: U.S. Air Force (USAF); Wright-Patterson Air Force Base (WPAFB), Ohio

Affected Location: WPAFB, Ohio

Proposed Action: Addition to the National Museum of the United States Air Force

Report Designation: Environmental Assessment

Written comments and inquiries regarding this document should be directed to Ms. Karen Beason, EIAP Program Manager, 88 ABW/CEAOR, 1450 Littrell Road, WPAFB, Ohio, 45433-5209, (937) 257-5899, Karen.Beason@wpafb.af.mil.

Abstract: The National Museum of the United States Air Force (NMUSAF) requires an adequate facility to display its ever-growing collection of space vehicles and other historic artifacts that depict the material history of the USAF. The material is displayed to educate the general public and to train Air Force personnel in the technical and historic heritage of their service in the USAF.

To adequately display these artifacts, the USAF has proposed a 224,000 square foot addition to the existing museum center that would permit consolidation and integration of items currently on display with new acquisitions. As part of the proposed action, a fourth hangar, Hangar 4, would be constructed adjacent to the existing museum center.

This environmental assessment (EA) evaluates the Proposed Action and the No Action Alternative. Resources considered in the impact analysis are land use, air quality, noise, geological resources, water resources, biological resources, cultural resources, socioeconomics and environmental justice, transportation and infrastructure, health and safety, and hazardous materials and wastes. Analyses in this document identify minor short-term adverse impacts on air quality and noise resulting from construction activities. The EA was made available to the public on January 16, 2013, for a 30-day review period.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS

ABW	Air Base Wing
ACM	asbestos-containing material
AFB	Air Force Base
AF	Air Force
AFI	Air Force Instruction
AFPD	Air Force Policy Directive
AICUZ	Air Installation Compatible Use Zone
AIM	Architectural and Industrial Maintenance
APE	Area of Potential Effect
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
AST	above-ground storage tank
ATFP	Anti-Terrorism/Force Protection
AW	Airlift Wing
BASH	Bird/Wildlife Aircraft Strike Hazard
bgs	below ground surface
BHE	BHE Environmental, Inc.
BMP	best management practice
BMP/LTM	Basewide Monitoring Program/Long Term Monitoring
BS	burial site
CAA	Clean Air Act
CE	Civil Engineering Directorate
CEANP	Pollution Prevention and Sustainment Section of the Environmental Branch in the Asset Management Division, Civil Engineer Directorate
CEANQ	Environmental Quality Section of the Environmental Branch in the Asset Management Division, Civil Engineer Directorate
CEAOR	Planning and Real Estate Section of the Optimization Branch in the Asset Management Division, Civil Engineer Directorate
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CWA	Clean Water Act
CZ	clear zone
dB	decibel
dBA	A-weighted sound level measurement
DLSME	Defense Land Systems and Miscellaneous Equipment
DNL	day-night average A-weighted sound level
DoD	U.S. Department of Defense
EA	environmental assessment
EFDZ	earthfill disposal site
EIAP	Environmental Impact Analysis Process
EIFS	Economic Impact Forecast System
EIS	environmental impact statement
EISA	Energy Independence and Security Act
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act

LIST OF ACRONYMS (continued)

ESQD	Explosive Safety Quantity Distance
ESZ	Explosive Safety Zone
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
ft	foot/feet
FY	fiscal year
gpd	gallons per day
gpm	gallons per minute
HAZMART	hazardous material pharmacy
HUD	U.S. Department of Health and Urban Development
ICP	Integrated Contingency Plan
ICRMP	Integrated Cultural Resources Management Plan
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IMAX	Image Maximum
IRP	Installation Restoration Program
JP-8	Jet Fuel-8
LBP	lead-based paint
LF	landfill
LTM	long-term monitoring
$\mu g/m^3$	micrograms per cubic meter
MA	Metropolitan Area
MCD	Miami Conservancy District
MSA	Metropolitan Statistical Area
MSL	mean sea level
mg/m^3	milligrams per cubic meter
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NMUSAF	National Museum of the United States Air Force
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NO_2	nitrogen dioxide
NOI	Notice of Intent
NRHP	National Register of Historic Places
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resource Conservation Service
NSR	New Source Review
NWI	National Wetlands Inventory
O_3	ozone
OAC	Ohio Administrative Code

LIST OF ACRONYMS (continued)

ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code
OSHA	Occupational Safety and Health Administration
OU	operable unit
Pb	lead
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
$PM_{2.5}$	particulate matter with an aerodynamic particle size less than 2.5 micrometers
PM_{10}	particulate matter with an aerodynamic particle size less than 10 micrometers
POVs	privately owned vehicles
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
PSOA	Process Specific Opportunity Assessment
PTI	permit-to-install
RAPCA	Regional Air Pollution Control Agency
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROD	Record of Decision
ROI	region of influence
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SEL	sound exposure level
sf	square feet
SHPO	State Historic Preservation Office
SI	site investigation
SIP	State Implementation Plan
SO_2	sulfur dioxide
SOP	standard operating procedure
SPC	Spill Prevention Coordinator
SPCC	spill prevention and control and countermeasures
SR	State Route
SS	Spill Site
STEM	Science, Technology, Engineering, and Math
SWMP	Storm Water Management Plan
SWPPP	Storm Water Pollution Prevention Plan
TMDL	total maximum daily load
tpy	tons per year
TSCA	Toxic Substances Control Act
TSD	treatment, storage, disposal facility
UEC	Unit Environmental Coordinator
UFC	United Facilities Code
U.S.	United States
USACE	U.S. Army Corps of Engineers

LIST OF ACRONYMS (continued)

USAF	U.S. Air Force
USC	U.S. Code
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VOC	volatile organic compound
WPAFB	Wright-Patterson Air Force Base

1.0 PURPOSE AND NEED FOR ACTION

This section provides a brief introduction and facility description, a statement of the purpose of and need for the Proposed Action, an overview of the organization of the Environmental Assessment (EA), and a summary of the key environmental compliance requirements.

1.1 Project Description and History

The National Museum of the United States Air Force (NMUSAF) is internationally acclaimed as the world's oldest and largest military aviation museum, interpreting stories of the people of the United States Air Force (USAF) as well as the development and evolution of aerospace technology. The museum dates back to 1923 when the Engineering Division at Dayton's McCook Field first collected technical artifacts for preservation. In 1935 the museum got its first real home in the form of a specially designed building at Wright Field. By this time, the museum included more than 3,000 items. The new home was converted to wartime use in 1941, however, and the collection went into storage.

In 1971, the artifacts were moved to a permanent location at Wright-Patterson Air Force Base (WPAFB) when the current facility was first opened. Not including its annex on Wright Field, the museum has more than tripled in square footage since its inception in 1971, and the collection has grown to more than 360 aerospace vehicles and missiles, plus thousands of aviation artifacts on display. A major museum expansion, housing the Korean War and Southeast Asia War Galleries, opened in 1988 and was constructed in parallel and in similar appearance to the 1971 museum building, which resembles a military aircraft hangar.

In 1991, a 500-seat Image Maximum (IMAX) theatre was constructed in front of and connected to the existing Museum. As part of this construction, an 80-foot (ft) high glass atrium was constructed over the expanded lobby and serves as the architectural focal point for the entire complex. In 2003, the museum opened a third building, Hangar 3, which houses the Cold War Gallery. The latest addition, the Missile and Space Gallery (a cylindrical shaped building), opened in 2004 and is dedicated to telling the story of the Air Force's vital role in Soviet containment and strategic deterrence, as well as the Air Force's role in space and the importance of space-based capabilities to national security.

The additions to the main museum as well as the two hangars on the old Wright Field flight line provide more than 17 acres of indoor exhibition space. In 2004, the museum announced its official re-designation from the United States Air Force Museum to the NMUSAF. The name underscores the Museum's national mission, reinforces its world-class collection, and places it at a name level with industry peers such as the Smithsonian National Air and Space Museum, the National Museum of Naval Aviation, and the National Museum of the Marine Corps.

The NMUSAF collection contains many rare aircraft of historical or technological importance as well as various memorabilia and artifacts relating to the history and development of aviation. The NMUSAF interprets this history chronologically, via a series of exhibition hangars, with the most recent technological developments depicting the transition from atmospheric to space flight. The NMUSAF has many artifacts and is acquiring additional artifacts from the United States (U.S.) space program in order to interpret the Air Force role in space flight, such as Air Force personnel who crewed the pioneer spacecraft, the technological contribution of Air Force research and development, and the military aerospace industry.

The Museum currently consists of three hangars and is divided into galleries covering broad historic trends in military aviation. The galleries are further broken down to detail specific time periods and to show aircraft in their historical context.

The Museum has several Presidential aircraft, including those used by Franklin D. Roosevelt, Harry Truman, and Dwight D. Eisenhower. All presidential aircraft are on display in a separate Presidential Hangar next to the Research and Development and Flight Test Hangar, which are located east of the NMUSAF. The existing Presidential Hangar collection is within the secure perimeter fence on WPAFB property and is only accessible to the general public by special request. Visitors of the Presidential collection are transported by tour bus, which departs from and returns to the NMUSAF.

The Museum attracts over a million visitors per year from across the U.S. and foreign countries to its central Midwest location at WPAFB. Sixty-one percent of the U.S. population is within an 8 hour drive of the Museum. Recent years' visitor counts for the NMUSAF are as follows:

- 2006: 1,116,042 visitors
- 2007: 1,154,096 visitors
- 2008: 1,107,283 visitors
- 2009: 1,277,364 visitors
- 2010: 1,318,715 visitors
- 2011: 1,194,482 visitors

The proposed project would expand the Museum's current one million square feet (sf) of exhibit space with a fourth building (Hangar 4) that would house three galleries: Space Gallery, Presidential Aircraft Gallery, and Global Reach Gallery. The presence of the one-of-a-kind Presidential aircraft collection would continue to draw visitors nationwide and from foreign countries.

Softball and soccer fields are located adjacent to the Museum grounds and are operated by the 88 Air Base Wing (ABW) Force Support Squadron. There are no other Air Force community type facilities adjacent to the NMUSAF. The Dayton Aviation Heritage National Historic Park, a public-private

partnership managed by the National Park Service and including the Air Force, is a complimentary local tourist attraction that shares the same visitor base as the NMUSAF.

Wright-Patterson Air Force Base is located in the southwest portion of the state of Ohio in Greene and Montgomery counties, approximately 10 miles east of the city of Dayton. The Base encompasses 8,145 acres and is classified as non-industrial with mixed development. The Base is subdivided into two areas: Areas A and B. Area A consists primarily of administrative offices and contains an active airfield. Area B is located across State Route (SR) 444 to the southwest of Area A and consists primarily of research and development as well as educational functions. The NMUSAF is located in Facilities 20487, 20489, and 20494 on the Museum grounds and 20001 and 20009 in Area B. The Museum also has storage and restoration functions in Facilities 20004, 20005, 20006, 20107, and 20111 in Area B. **Figure 1-1** shows the location of WPAFB and the surrounding area. **Figure 1-2** shows the location of the proposed NMUSAF addition adjacent and south of the existing museum center. **Figure 1-3** shows the location of existing NMUSAF Facilities and the Museum's storage and restoration Facilities.

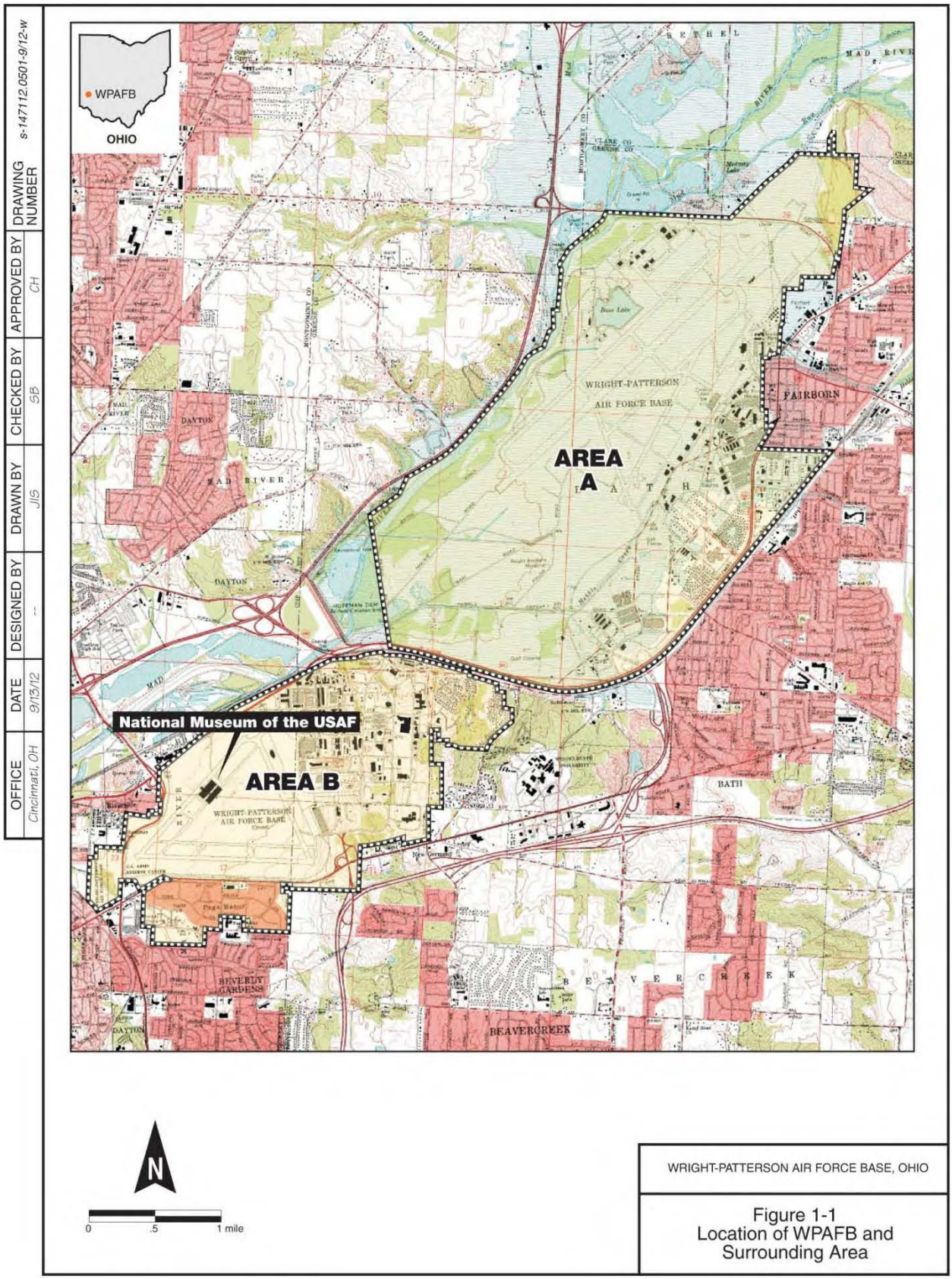
This EA presents the USAF's Proposed Action for an addition to the NMUSAF at WPAFB. The No Action Alternative is also analyzed. If the analyses presented in the EA indicate that implementation of the Proposed Action would not result in significant environmental impacts, a Finding of No Significant Impact (FONSI) would be prepared. A FONSI briefly presents reasons why a Proposed Action would not have a significant effect on the human environment and why an environmental impact statement (EIS) is unnecessary. If significant environmental issues would result that cannot be mitigated to insignificance, an EIS would be required, or the Proposed Action would be abandoned and no action would be taken.

The USAF has prepared this EA in accordance with the National Environmental Policy Act (NEPA) of 1969; 40 Code of Federal Regulations (CFR), Parts 1500-1508, the Council on Environmental Quality (CEQ) regulations implementing NEPA; and the USAF Environmental Impact Analysis Process (EIAP) [32 CFR Part 989].

1.2 Purpose and Need

The NMUSAF requires an adequate facility to display its ever-growing collection of space vehicles and other historical artifacts that depict the material history of the USAF. The material is displayed to educate the general public and to train Air Force personnel in the technical and historic heritage of their service in the USAF.

The proposed 224,000 sf addition would permit consolidation and integration of items currently on display with new acquisitions. The Space Gallery would display space vehicles, assorted rocket engines, and other historical articles that relate to the Air Force's mission in space. The Presidential Gallery would display the museum's collection of Presidential aircraft. The Global Reach Gallery would display


WPAFB
OHIO
AREA A
AREA B
National Museum of the USAF
WRIGHT-PATTERSON AIR FORCE BASE
DAYTON
FAIRBORN
BEAVERCREEK
BATH
BEVERLY GARDENS
MAD RIVER
BETHEL
N
0
.5
1 mile
OFFICE Cincinnati, OH
DATE 9/13/12
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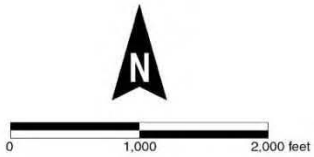
APPROVED BY CH
DRAWING NUMBER s-147112.0501-9/12-w
WRIGHT-PATTERSON AIR FORCE BASE, OHIO
Figure 1-1
Location of WPAFB and
Surrounding Area

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	9/19/12	--	JIS	SB	CH	s-147112.0501-9/12-w

WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 1-2
Location of Proposed
NMUSAF Addition

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	10/24/12	--	JIS	SB	CH	s-147112.0601-10/12-w



WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 1-3
Existing NMUSAF Facilities

exceptionally large aircraft such as the C-5 transport and the C-141 "Hanoi Taxi", which is famous for repatriating prisoners of war during the final days of the Vietnam War.

The Museum's collection of Presidential aircraft (Facility 20009) and Research and Development (R&D) (Facility 20001) galleries are currently located approximately one mile from the existing Museum complex in two hangars located in a secured portion of WPAFB. Due to the additional time involved in arranging visitor access to the Presidential collection, the shuttle bus service restricts the number of visitors who view the collection. The NMUSAF currently does not have adequate space to interpret the air mobility mission of the Air Force and the existing Museum space does not allow for display of these aircraft due to the lack of a facility to properly house and preserve them.

1.3 Scope of Environmental Analysis

Consistent with the CEQ regulations, the EA will be organized into the following sections:

- Section 1, Purpose and Need for Action, includes a background description, purpose and need statement, EA organization and scope of environmental analysis, and regulatory framework;
- Section 2, Description of Proposed Action and alternatives, includes a process for alternatives development, alternatives considered but eliminated, and a comparison of impacts;
- Section 3, Affected Environment, includes a description of the natural and man-made environments within and surrounding WPAFB that may be affected by the Proposed Action or the No Action Alternative;
- Section 4, Environmental Impacts, includes definitions and discussions of direct and indirect impacts, and mitigation and monitoring. The section also includes an analysis of the potential cumulative impacts on WPAFB; unavoidable adverse impacts; the relationship between short-term use of the human environment and the maintenance and enhancement of long-term productivity; and irreversible and irretrievable commitments of resources;
- Section 5, List of Preparers;
- Section 6, Consultation and Coordination, contains a list of agencies consulted in the preparation of this document;
- Section 7, References, contains references for studies, data, and other resources used in the preparation of the EA; and
- Appendices, as required.

The NEPA, which is implemented through the CEQ regulations, requires federal agencies to consider alternatives to proposed actions and to analyze impacts of those alternatives. Potential impacts of the Proposed Action and the No Action alternative described in this document will be assessed in accordance with the USAF EIAP, which requires that impacts to resources be analyzed in terms of context and intensity of effects that may affect the quality of the human environment. In order to help the public and decision-makers understand the implications of impacts, they will be described in the short- and long-term, cumulatively, and within context.

Environmental issues analyzed in the EA include:

- Land Use;
- Air Quality;
- Noise;
- Geology and Soils;
- Water Resources;
- Biological Resources, including vegetation, wetlands, wildlife, and threatened and endangered species;
- Cultural Resources;
- Socioeconomics;
- Environmental Justice;
- Transportation and Infrastructure;
- Health and Safety; and
- Hazardous Materials and Waste.

1.4 Regulatory Framework

This section describes the statutes, regulations, and executive orders that govern and/or influence the scope of this EA. Although this list is not all-inclusive, the proposed alternatives must comply with all applicable regulatory requirements.

1.4.1 National Environmental Policy Act

The NEPA is a Federal statute requiring the identification and analysis of potential environmental impacts of proposed Federal actions before those actions are taken. The NEPA mandates a structured approach to environmental impact analysis that requires Federal agencies to use an interdisciplinary and systematic approach in their decision-making process. This process evaluates potential environmental consequences associated with a proposed action and considers alternative courses of action. The intent of NEPA is to protect, restore, or enhance the environment through well-informed Federal decisions.

The CEQ was established under NEPA to implement and oversee Federal policy in this process. The CEQ regulations specify the reasons to prepare an EA:

- Briefly provide evidence and analysis for determining whether to prepare an EIS or a FONSI
- Aid in an agency's compliance with NEPA when an EIS is unnecessary
- Facilitate preparation of an EIS when one is necessary

Air Force Policy Directive (AFPD) 32-70, *Environmental Quality*, states that the USAF will comply with applicable Federal, State of Ohio, and local environmental laws and regulations, including NEPA. The USAF's implementing regulation for NEPA is EIAP (32 CFR Part 989).

1.4.2 Integration of Other Environmental Statutes and Regulations

To comply with NEPA, the planning and decision making process for actions proposed by Federal agencies involves a study of other relevant environmental statutes and regulations. The NEPA process, however, does not replace procedural or substantive requirements of other environmental statutes and regulations. It addresses them collectively in the form of an EA or EIS, which enables the decision-maker to have a comprehensive view of major environmental issues and requirements associated with the Proposed Action. According to CEQ regulations, the requirements of NEPA must be integrated "with other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively."

1.4.3 Interagency and Intergovernmental Coordination for Environmental Planning and Community Involvement

The NEPA requirements help ensure that environmental information is made available to the public during the decision making process and prior to actions being taken. The premise of NEPA is that the quality of Federal decisions will be enhanced if proponents provide information to the public and involve the public in the planning process. The CEQ regulations implementing NEPA specifically state, "There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process shall be termed scoping."

The Intergovernmental Coordination Act and Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, require Federal agencies to cooperate with and consider state and local views in implementing a Federal proposal. Air Force Instruction (AFI) 32-7060 requires the USAF to implement a process known as Interagency and Intergovernmental Coordination for Environmental Planning (IICEP), which is used for the purpose of agency coordination and implements scoping requirements.

Through the IICEP process, the USAF notified relevant Federal, state, and local agencies of the action proposed and provide them the opportunity to make known their environmental concerns specific to the action. The IICEP process provides the USAF the opportunity to cooperate with and consider state and local views in implementing the Federal proposal. An IICEP letter was sent to the U.S. Fish and Wildlife Service (USFWS); Ohio Department of Natural Resources (ODNR); Miami Conservancy District (MCD); and Ohio State Historic Preservation Office (SHPO). Agency responses were provided to 88 ABW Civil Engineer Directorate Asset Management Division and incorporated into the analysis of potential environmental impacts performed as part of the EA. The IICEP correspondence is included in **Appendix B**.

A Notice of Availability (NOA) for the Draft Final EA and FONSI were published in the *Dayton Daily News* and the base paper, *The Skywrighter*, initiating a 30-day public review period. The Draft Final EA and Draft Final FONSI were also made available in the Fairborn Public Library. During the 30-day public review period, no public comments were received. The NOA is included in **Appendix B**.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This section describes a detailed description and criteria used in selecting the Proposed Action; describes the No Action Alternative; identifies alternatives eliminated from further consideration; and compares environmental consequences between the alternatives.

2.1 Alternatives Selection Criteria

The development of reasonable alternatives involved discussions with the members of the NMUSAF, the Environmental Planning Function (EPF), and the Civil Engineer Project Management Branch to identify a Proposed Action. Several requirements were identified in order to fulfill the purpose of the Proposed Action at WPAFB. The Proposed Action and other alternatives were screened against the following criteria:

- Any alternative evaluated must meet the overall objectives and mission of the NMUSAF of providing a facility and location to display its ever-growing collection of space vehicles and other historical artifacts which depict the material history of the Air Force;
- Any alternative evaluated must meet the overall objectives and mission of the NMUSAF to adequately preserve its collection of historical artifacts in a secure, climate-controlled area;
- Any alternative must not require the purchase or donation of land to meet the alternative design;
- Any alternative must not require the acquisition of a waiver. For example, the chosen alternative must not require the Air Force to obtain a waiver to construct within transitional areas or glide slopes;
- Due to manpower constraints base-wide, no alternative can have substantive impacts on mission operations; and
- Any alternative evaluated must fully comply with all federal, state, and local laws and regulations, as well as Department of Defense (DoD) and Air Force policies, directives, and regulations.

The Proposed Action would provide the necessary operational and location requirements that would enable the NMUSAF to preserve and display its military artifacts for public interpretation.

2.2 Description of Proposed Action

The Proposed Action involves construction of a 224,000 sf, climate-controlled, secure addition to the south end of the existing NMUSAF, which currently contains three hangars, referred to as Hangar 1, Hangar 2, and Hangar 3. The proposed fourth hangar, Hangar 4, would include a gallery dedicated to presenting the Air Force's past, present, and future in space. Hangar 4 would include one of the most popular exhibits, the Presidential aircraft, which is currently located in a hangar one mile from the NMUSAF in a secured area of WPAFB. No facility demolition activities are planned in association with the Proposed Action. Proposed construction activities and exhibit planning involved with Hangar 4 are discussed below.

2.2.1 Addition of NMUSAF

The proposed site location for Hangar 4 is within the NMUSAF campus, located in the infield of the decommissioned Area B airfield. The proposed site is next to the Cold War Gallery and the Missile Gallery (Hangar 3). The proposed site would support the size requirement for construction of the 224,000 sf facility. Below is a description of the proposed building construction for Hangar 4.

Building Description

Hangar 4 would be located approximately 195 ft south of Hangar 3 in a parallel configuration (**Figure 2-1**). Concrete tow lanes would extend from existing Hangar 3 tow lanes and would provide access to the doors on the east and west ends of Hangar 4. The addition would be similar to Hangar 3 in size and appearance. A connector with Hangar 3 would be constructed for the purpose of continuing the main circulation spine from Hangar 3 and connect into the north side of the Hangar 4 exhibit space. The connector would allow for circulation around the existing central stairs of the Hall of Missiles (Hangar 3) and into curved corridors that bring the circulation flow back into a single spine before entering into the proposed Hangar 4 exhibit space.

Hangar 4 would consist of a metal barrel vaulted exhibition hangar with a concrete foundation and floor slab, structural framing, and a prefinished metal skin. The building would include fire protection, alarms, heating ventilation and air conditioning (HVAC), power, lighting systems, a taxiway connection to the building to get aircraft and large artifacts into the building, and an enclosed walkway connection to Hangar 3, as described above. The design of Hangar 4 would be architecturally compatible with the interior and exterior of the existing museum.

Hangar 4 would be designed to support exhibits on a thick concrete slab on grade to accommodate aircraft point loads and suspended smaller aircraft from the primary arch trusses. The footprint would be similar in length and width to Hangar 3 and would be constructed of structural steel truss arches pinned at the foundation connection and rising to approximately 88 ft above the finished floor.

Building Finishes

Hangar 4 exterior finishes would consist of prefinished metal wall panels with some exposed case-in-place concrete walls. The roofing panels would span between roof joists bearing on the primary arched steel trusses and would have periodic expansion control joints. The finish color of the metal roofing and wall panels would match the existing Hangar 3. The majority of the exposed finishes within the hangar, including structure but excluding the fire detection piping, would be painted black.

Interior Support Spaces

The interior support spaces would be similar in type and configuration to that currently in Hangar 3. The spaces would house mechanical and electrical equipment and provide storage area for the museum.

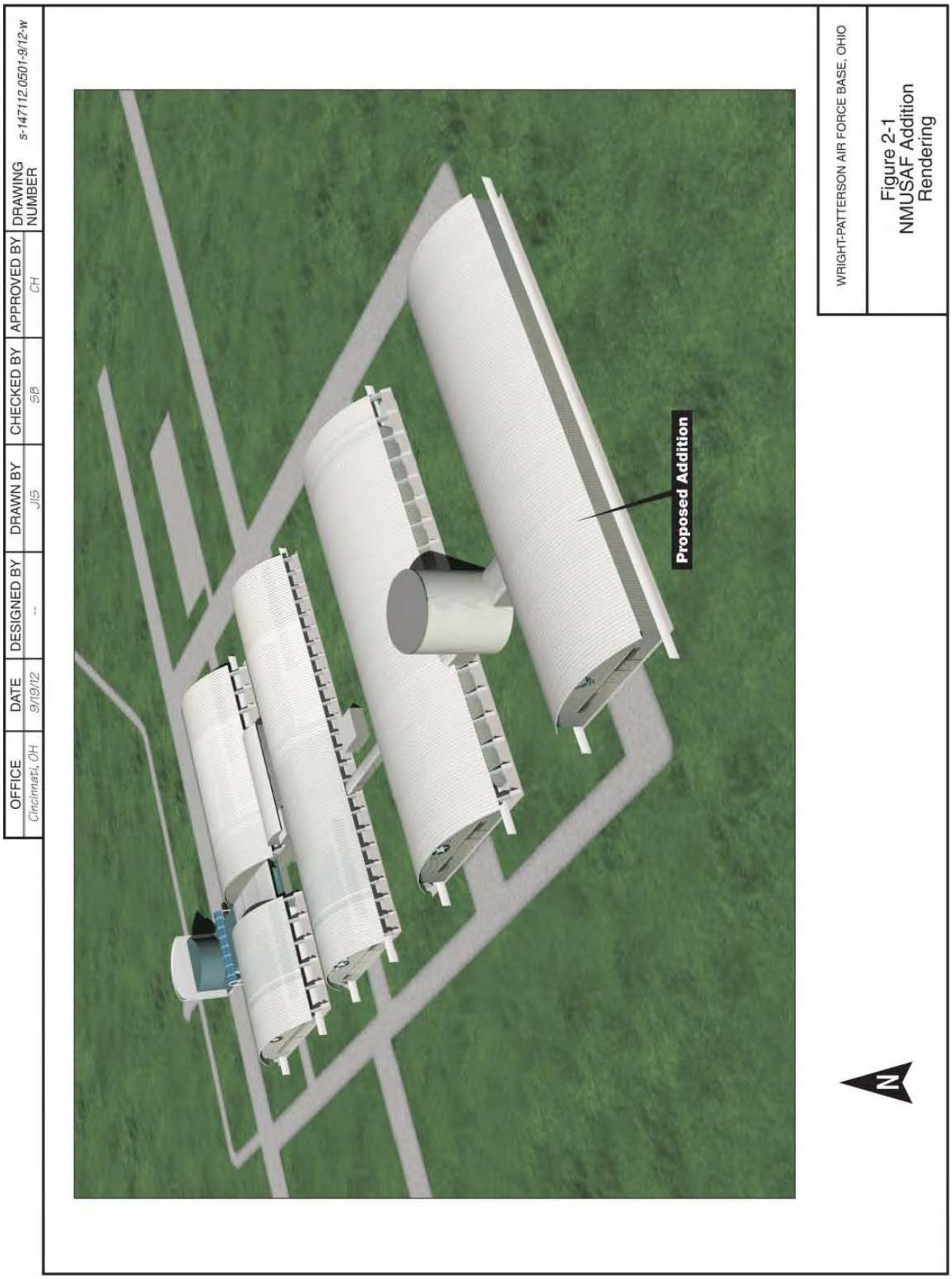

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Figure 2-1
NMUSAF Addition
Rendering

End Walls/Doors

The end walls of Hangar 4 would be de-constructible and re-constructible in order to move the C-5 and other large aircraft in and out of the facility. The hangar door on the west end would be sized for smaller aircraft and would match the size of the Hangar 3 doors.

The hangar end walls would be constructed of light gage steel girts with wide flange steel wind columns. It is not feasible to create a hangar door to fulfill the requirement to place a C-5 aircraft in Hangar 4; therefore, end walls similar to those in Hangar 3 would be de-constructed for placement or removal of a C-5 aircraft.

Roof and Floor

The roof structure of Hangar 4 would consist of a 7-ft-deep steel arched truss, which would be supported by two cast-in-place concrete buttresses. The arch thrust forces would be resisted by a post tensioned cable placed under the hangar slab, between opposing buttresses. The floor would consist of a reinforced concrete slab on grade. Minimum thickness to resist display weights such as the space shuttle and the C-5 aircraft varies from 9 to 12 inches.

Utilities

All utilities would be a continuation of the existing system that was constructed as part of Hangar 3 in 2004. A loop would branch off the existing 8-inch water system and supply for both fire protection and potable water to Hangar 4. Four new fire hydrants would be located on the east, west, and south sides of Hangar 4; existing hydrants would cover the north. Gas lines would connect to the existing 4-inch main near the southeast corner of Hangar 2. The storm sewer conveyance for Hangar 4 matches the design of the system constructed for Hangar 3. Flow from catch basins on both sides of Hangar 4 would flow to the west and connect to an existing drainage structure near the southwest corner of Hangar 3.

Security

Since there is no controlled perimeter for the museum, the standoff from the outside of the structure is required to be 148 ft according to Unified Facilities Criteria (UFC) 4-010-01. Where the tow roads turn to access the doors on the ends of the new hangar, bollards would be placed in order to restrict unauthorized vehicles from entering. Construction projects under the Proposed Action would include required Anti-Terrorism/Force Protection (ATFP) measures and conform to applicable State of Ohio and WPAFB building codes and regulations.

Hangar Displays

Displays would be hung from the underside of the roof. The displays would only be able to hang from the primary arch trusses. Hangar 3 currently has the capacity to hang 500 pounds in the center third of the arch and 6,000 pounds in the outer thirds of the arch. Hangar 4 would be constructed similar to Hangar 3 so that similar weights could be hung from the arch trusses.

Hangar 4 Gallery Layout

Hangar 4 would be connected to the existing three hangars and would contain three display genres: Presidential Gallery, Space-Missile Gallery, Global Reach Gallery (including a C-5 Galaxy, and KC-135, and C-141 Hanoi Taxi aircraft). Satellites and smaller craft would be suspended from the ceiling. **Table 2-1** presents a description of each gallery proposed for Hangar 4. The layout of Hangar 4 is presented in **Figure 2-2**:

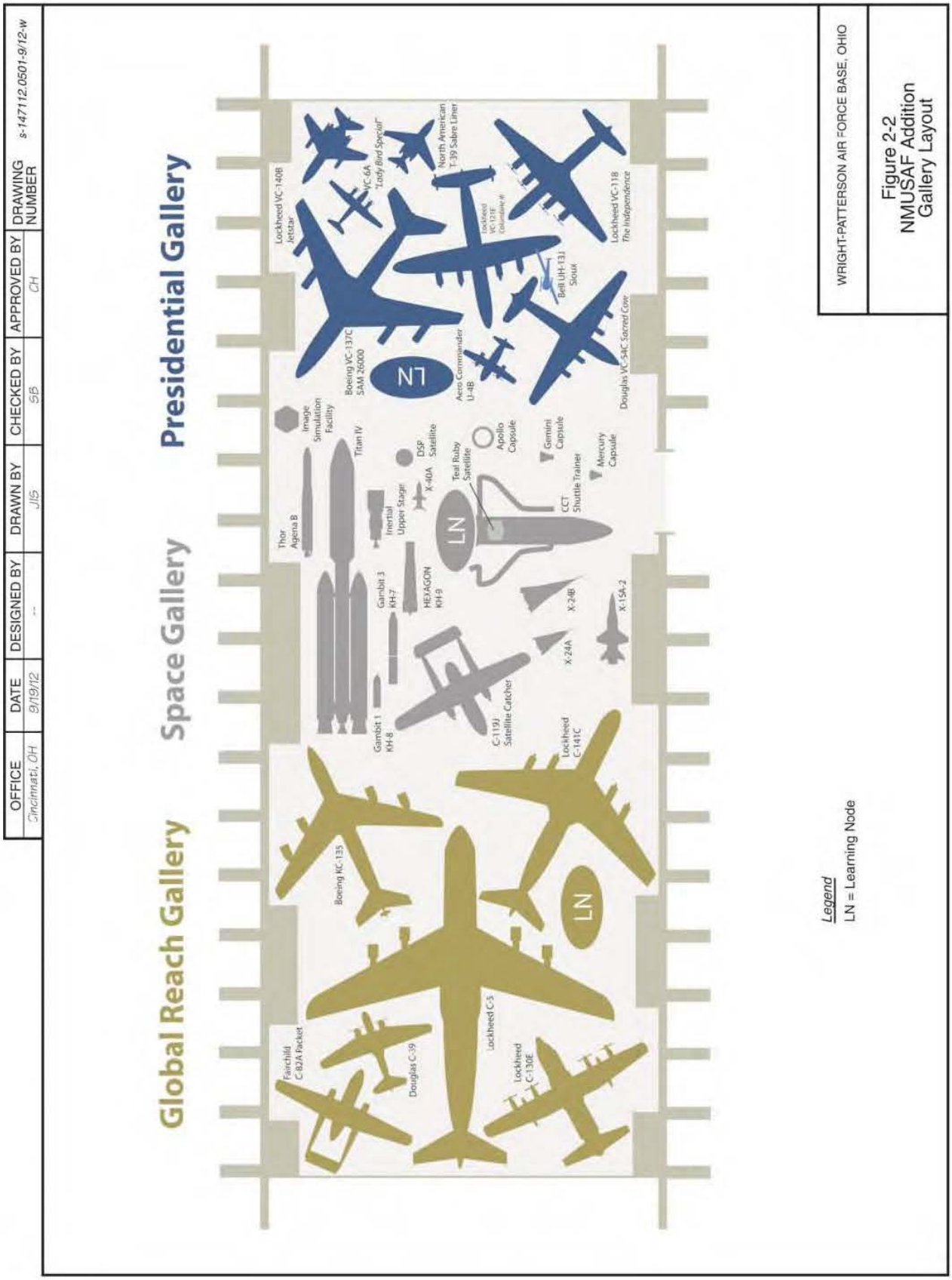
Table 2-1. Hangar 4 Galleries Description

Gallery	Description
Space Gallery	Interprets the remarkable story of Air Force activities in space and displays a National Aeronautics and Space Administration (NASA) Crew Compartment Trainer (CCT) as a major exhibit. The CCT is a representation of a space shuttle orbiter crew station used for on-orbit crew training and engineering evaluations. This gallery includes a Titan IV space launch vehicle, Mercury, Gemini and Apollo spacecraft, and many recently retired NASA artifacts such as a nose cap assembly, landing gear strut and a variety of astronaut equipment. In addition, a range of satellites and related items showcase the Air Force's vast reconnaissance, early warning, communications and other space-based capabilities. Other new exhibits would be developed to showcase Air Force technologies with many unique characteristics in design, propulsion, payload capacity, human factors, communication, range, speed, and operating environment.
Presidential Aircraft Gallery	Contains nine presidential aircraft including, but not limited to, the Douglas VC-54 used by Presidents Roosevelt and Truman, the Douglas VC-118 used by President Truman, the Lockheed VC-121E used by President Eisenhower, and the Boeing VC-137C used by President Kennedy.
Global Reach Gallery	Houses and displays large aircraft currently in the museum's collection, such as the C-141 Hanoi Taxi, and those anticipated to become part of the collection, such as a C-5 Galaxy and KC-135. The Air Force's airlift and air refueling missions are also to be explained in this gallery.

2.2.2 Educational Programming

As part of the Proposed Action, educational exhibits would be displayed that emphasize Science, Technology, Engineering, and Math (STEM) programs. Proposed exhibits would showcase Air Force technologies and would include unique characteristics in design, propulsion, payload capacity, human factors, communication, range, speed, and operating environment.

A unique feature of Hangar 4 would be the creation of dedicated, interactive spaces for learning in the Presidential, Space, and Global Reach galleries. Three learning nodes would provide a unique environment for lectures and demonstrations, as well as extensions of the exhibit experience. The learning nodes would include 60 seats and would allow museum staff to facilitate new STEM experiences, while guest scientists and engineers from Air Force organizations, the aerospace industry, and area colleges and universities would be invited to share their expertise. Multimedia presentations would introduce students to air and space missions and the men and women responsible for execution of the missions.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Space Gallery
Presidential Gallery
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Boeing KC-135
Douglas C-9
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Lockheed C-130E
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Gambit 3 KH-7
HEXAGON KH-9
C-119J Satellite Catcher
Lockheed C-141C
X-24A
X-24B
X-15A-2
Thor Agena B
Titan IV
Inertial Upper Stage
X-40A
DSP Satellite
Teal Ruby Satellite
CCT Shuttle Trainer
Image Simulation Facility
Apollo Capsule
Gemini Capsule
Mercury Capsule
LN
Lockheed VC-140B Jetstar
Boeing VC-137C SAM 26000
Aero Commander U-4B
VC-6A "Lady Bird Special"
North American T-39 Sabre Liner
Lockheed VC-121E Constellation
Bell UH-1J Sioux
Douglas VC-54C Sacred Cow
Lockheed VC-118 The Independence
Legend
LN = Learning Node
WRIGHT-PATTERSON AIR FORCE BASE, OHIO
Figure 2-2
NMUSAF Addition
Gallery Layout

Starbase

Starbase is an existing DoD program that serves the local community youth by offering students an opportunity to participate in learning experiences designed to increase interest in and knowledge of math, science, and technology. The goal of Starbase is to motivate elementary students (primarily fifth graders) to explore science, technology, engineering, and math as they continue their education. Starbase targets students in inner city and rural locations, who are socio-economically disadvantaged, low in academic performance, and/or have a disability. Starbase works with local school districts to support their standards of learning objectives while engaging students through inquiry-based curriculum and hands-on experiential activities (Starbase 2012).

2.3 No Action Alternative

Under the No Action Alternative, there would be no addition constructed to the existing NMUSAF and the museum would not have a location for the preservation and interpretation of artifacts from the space program and the air mobility mission. The Museum's collection of Presidential aircraft would continue to provide limited access to the public due to its current location in a secure area on WPAFB. Under the No Action Alternative, the Presidential collection would continue to be accessible to less than 10 percent of Museum visitors who are escorted to the collection via bus service to and from the secure area. The mission of the NMUSAF to preserve, display, and interpret the rich history of the USAF would be compromised.

Under the No Action Alternative, the artifacts currently displayed outside would continue to deteriorate. The continued wear on those artifacts due to exposure to the elements is contrary to the preservation of artifacts. Interpretation of artifacts and accessibility by Museum visitors would be impeded by outside displays due to inclement weather, particularly during winter months.

Recent construction has created a Cold War Gallery and Missile Gallery, interpreting the transition to space flight, but manned flight and military exploration of space is not currently interpreted. Prolonged outdoor display of these priceless articles would not be feasible due to deterioration from environmental conditions. Outdoor display would also subject artifacts such as space capsules and the space shuttle to contiguous ultraviolet radiation. This degrades materials such as tires, windows, and seals, which would ordinarily undergo maintenance after flight in the case of the shuttle, or would have limited exposure, in the case of space capsules. Outdoor displays would also not be optimal for NMUSAF visitors, as rain, snow, and cold prevent in-depth interpretation of key aspects of the artifacts.

Although the No Action Alternative does not satisfy the purpose and need to provide an adequate facility to display its ever-growing collection of historical artifacts depicting the material history of the USAF, it is included in the environmental analysis to provide a baseline for comparison with the Proposed Action and is analyzed in accordance with CEQ regulations for implementing NEPA. Although the No Action Alternative would eliminate unavoidable adverse, short- and long-term impacts associated with the

Proposed Action, the No Action Alternative would not satisfy selection criteria established for this project, resulting in:

- No interpretation of the USAF's role in manned flight or military exploration of space.
- Prolonged outdoor display of priceless historical artifacts to continuous ultraviolet radiation.
- Prevention of in-depth interpretation of key aspects of outdoor artifacts on display due to inclement weather (rain, snow, cold).
- The distant Presidential collection location would continue to limit access to Museum visitors who are shuttled to the secure Base location.
- The Presidential collection located on the secure Base would continue to be increasingly crowded as additional aircraft are obtained and added to the collection.

2.4 Alternatives Eliminated from Further Study

As part of the NEPA process, potential alternatives to the Proposed Action must be evaluated. For alternatives to be considered reasonable and warrant further detailed analysis they must be affordable, implementable, and meet the purpose and need for the proposal based on the project requirements stated in Section 2.3. Several alternatives to the Proposed Action were considered. One alternative involved constructing Hangar 4 approximately 1,200 ft northeast of the existing museum center in the location of the baseball fields as shown on **Figure 1-2**. This alternative was eliminated from further analysis because it does not meet the purpose and need of providing an adequate facility that would consolidate and integrate items currently on display with new acquisitions. The alternative involving construction of Hangar 4 at a separate location from the existing museum does not meet the purpose and need and was therefore eliminated based on its potential to require a purchase of land.

A second alternative involved constructing Hangar 4 in the tow path located adjacent to the existing museum, the adjacent airfield, and in the nearby baseball fields. On-going development restrictions prohibit development within the tow path, airpark, and/or baseball fields.

Several alternatives considered involved constructing Hangar 4 at other locations on-Base. However, these alternatives also did not meet the purpose and need as the addition would be separate from the existing NMUSAF complex and would require the continued use of a bus service to transport visitors to another part of the Base.

2.5 Comparison of Environmental Consequences

The impacts associated with the Proposed Action and the No Action Alternative are summarized in **Table 2-2**. The information includes a concise definition of the issues addressed and the environmental impacts associated with each alternative. The analysis is based on information discussed in detail in Section 4.0, Environmental Consequences.

Table 2-2. Comparison of Environmental Consequences

Affected Environment	Proposed Action	No Action
Land Use	Short-Term: No impact because no changes to land use would occur at or surrounding WPAFB. Long-Term: Same as short-term.	Short-Term: No impact Long-Term: No impact
Air Quality	Short-Term: Minor, short-term adverse impact from particulate matter and engine exhaust emissions generated during construction activities. Impacts would be minor because emissions would be short in duration and are negligible with respect to overall emissions expected for the region. Long-Term: No adverse impact.	Short-Term: No impact Long-Term: No impact
Noise	Short-Term: Minor, short-term adverse impacts on ambient noise from construction activities. Impacts would be minor because these activities would be carried out during normal working hours. Long-Term: No impact	Short-Term: No impact Long-Term: No impact
Geology and Soils	Short-Term: Minor impacts to existing soils during construction activities. Impacts would be minimized by implementing Best Management Practices (BMPs) for erosion and sedimentation controls. Long-Term: No impact to soil, topography, or physiographic features.	Short-Term: No impact Long-Term: No impact
Water Resources		
Groundwater	Short-Term: No impact Long-Term: No impact	Short-Term: No impact Long-Term: No impact
Surface Water	Short-Term: Adverse impact from surface water runoff during construction activities. Impacts would be minor because erosion and sedimentation controls would be implemented. Long-Term: Negligible impact due to increase in impervious surface area at NMUSAF. Impacts would be minimized by addressing the increased storm water flow in the design of the new addition.	Short-Term: No impact Long-Term: No impact
Floodplains	Short-Term: No impact because the project site is not located within a floodplain. Long-Term: No impact	Short-Term: No impact Long-Term: No impact
Biological Resources		
Vegetation	Short-Term: No adverse impact as the project site is located in a grass-covered area. Impacts would be negligible because construction activities would take place on previously disturbed areas with no naturally occurring vegetation. Long-Term: No impact	Short-Term: No impact Long-Term: No impact

Affected Environment	Proposed Action	No Action
Biological Resources (continued)		
Wildlife	Short-Term: Negligible impact on wildlife as the proposed project area does not provide suitable habitat, the current land use would not change, and proposed activities are not in close enough proximity to any threatened or endangered species to generate noise-related effects from proposed construction activities.	Short-Term: No impact
	Long-Term: No impact	Long-Term: No impact
Threatened and Endangered Species	Short-Term: Negligible impact on threatened and endangered species as the proposed project area does not provide suitable habitat and the current land use would not change.	Short-Term: No impact
	Long-Term: No impact	Long-Term: No impact
Wetlands	Short-Term: No impacts as no wetlands exist within the project area.	Short-Term: No impact
	Long-Term: No impact	Long-Term: No impact
Cultural Resources	Short-Term: No impact. No building demolition is proposed as part of the project and no known cultural resources exist within the footprint of the proposed project addition. Historic artifacts within the existing NMUSAF hangars would not be disturbed during construction.	Short-Term: No impact
	Long-Term: Beneficial impacts due to the protection of and preservation of historic artifacts.	Long-Term: No impact
Socioeconomics	Short-Term: Negligible effect on local workforce. Beneficial impact on local economy from revenue generated by construction activities.	Short-Term: Minor adverse impact as display of ever-growing military and space artifacts would not be available for public interpretation.
	Long-Term: Potential beneficial impact from the anticipated increase in visitors to the NMUSAF.	Long-Term: Same as short-term.
Environmental Justice	Short-Term: No impact	Short-Term: No impact
	Long-Term: No impact	Long-Term: No impact
Transportation and Infrastructure	Short-Term: Negligible impact from construction traffic during construction of the Museum addition. Negligible impacts from utilities as there would be no substantial increase in personnel or facility operations.	Short-Term: No impact
	Long-Term: Minor long-term adverse impact due to increased utility costs in operating Hangar 4.	Long-Term: No impact
Health and Safety	Short-Term: Potential minor impacts to workers during construction activities. Impacts would be minimized by adherence to health and safety regulations and standards.	Short-Term: No impact
	Long-Term: No impact	Long-Term: No impact
Hazardous Materials/Waste		
Hazardous Materials	Short-Term: Negligible impact. Hazardous materials used during construction activities would not be expected to increase.	Short-Term: No impact
	Long-Term: No impact	Long-Term: No impact
Hazardous Waste	Short-Term: Negligible impact. Hazardous wastes generated during construction would not be expected to increase.	Short-Term: No impact
	Long-Term: No impact	Long-Term: No impact

Affected Environment	Proposed Action	No Action
Hazardous Materials/Waste (continued)		
Asbestos-Containing Material (ACM) and Lead-Based Paint (LBP)	Short-Term: No impact. No building demolition is planned as part of the proposed project. These materials would not be used in the construction of Hangar 4.	Short-Term: No impact
	Long-Term: No impact	Long-Term: No impact
Environmental Restoration Program (ERP)	Short-term: No as there are no ERP sites in proximity to the proposed site.	Short-Term: No impact
	Long-term: No impact	Long-term: No impact

3.0 AFFECTED ENVIRONMENT

This section describes the current environmental and socioeconomic conditions most likely to be affected by the Proposed Action. It provides information to serve as a baseline from which to identify and evaluate environmental and socioeconomic changes likely to result from implementation of the Proposed Action.

In compliance with NEPA, CEQ regulations, and 32 CFR 989, the description of the affected environment focuses on those resources and conditions potentially subject to impacts. These resources and conditions include land use, air quality, noise, geology and soils, water resources, biological resources, cultural resources, socioeconomics, environmental justice, transportation and infrastructure, health and safety, and hazardous materials and wastes. Analysis of potential environmental effects focuses on those resource areas that are appropriate for consideration in light of a proposed action. All resource areas are initially considered, but some may be eliminated from detailed examination because they do not directly apply to a particular proposal.

3.1 Land Use

3.1.1 Definition of the Resource

The term land use refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel. In many cases, land use descriptions are codified in local zoning laws. There is, however, no nationally recognized convention or uniform terminology for describing land use categories. As a result, the meanings of various land use descriptions, labels, and definitions vary among jurisdictions.

Natural conditions of property can be described or categorized as unimproved, undeveloped, conservation or preservation area, and natural or scenic area. There is a wide variety of land use categories resulting from human activity. Descriptive terms often used include residential, commercial, industrial, agricultural, institutional, and recreational.

Two main objectives of land use planning are to ensure both orderly growth and compatible uses among adjacent property parcels or areas. Tools supporting land use planning include written master plans/management plans and zoning regulations. In appropriate cases, the locations and extent of proposed actions need to be evaluated for their potential effects on project sites and adjacent land uses. The foremost factor affecting a proposed action in terms of land use is its compliance with any applicable land use or zoning regulations. Other relevant factors include existing land use at the project site, the types of land uses on adjacent properties and their proximity to a proposed action, the duration of a proposed activity, and its "permanence."

To address land use with respect to noise and safety associated with aircraft operations, DoD required military departments to establish an Air Installation Compatible Use Zone (AICUZ) program. The goal of AICUZ is to promote compatible land use around air bases by providing information concerning aircraft operations, noise exposure, and accident potential to local governments (WPAFB 1995a, 2001).

One component of the AICUZ study was the development of noise contours. These contours are produced by the computerized Day-Night Average A-Weighted Sound Level (DNL) metric and the NOISEMAP methodology. In the context of aircraft operations, land use compatibility is also described in the context of noise levels. The AICUZ study included both the conditions that existed at the time the study was prepared as well as a Maximum Mission Scenario that was based on the noise effects of various potentially feasible mission changes.

The Maximum Mission (also known as Mission Capacity) Scenario was established for WPAFB to provide consistency when zoning and land use policies in the community are established. Because the noise contours were based on conservative assumptions regarding future missions, local zoning does not need to be adjusted with changes in missions. Therefore, the noise contours for the Maximum Mission Scenario remain in effect for local community planning purposes. Noise contour analysis is addressed in Section 3.3 of this EA.

The AICUZ program is also intended to reduce the potential for aircraft mishaps in populated areas. As a result of this program, WPAFB has altered basic flight patterns to avoid heavily populated areas. In addition, airfield safety zones were established under AICUZ to minimize the number of people who would be injured or killed if an aircraft crashed. Three safety zones are designated at the end of all active runways: Clear Zone (CZ), Accident Potential Zone (APZ) I, and APZ II.

The CZ represents the most hazardous area. The APZs are outside of the CZs. The APZ I is located immediately beyond the CZ and has a high potential for accidents. The APZ II is immediately beyond APZ I and has measurable potential for accidents. While aircraft accident potential in APZs I and II does not necessarily warrant acquisition by USAF, land use planning and controls are strongly encouraged for the protection of the public. Compatible land uses are specified for these zones. According to AFI 32-7063, all new construction is required to comply with the AICUZ.

3.1.2 Existing Conditions

On-Base Land Use

Wright-Patterson Air Force Base comprises 8,145 acres near Dayton, Ohio, and is divided into two areas: A and B. Area A contains administrative activities, airfield operation, maintenance, and civil engineering activities; and Area B focuses on acquisition, education, research, and development. The Base is expected to fulfill numerous roles within the USAF, incorporating both natural and man-made

development constraints within the Base boundaries. Over 2,500 acres of WPAFB remain undeveloped due to various development constraints.

There is a wide variety of land use classifications on WPAFB. Open Space and Outdoor Recreation represent some of the land constrained from development. Over 2,000 acres of this undeveloped land lies within the natural constraints area, which is composed of areas such as floodplains, lakes, wetlands, or areas with unsuitable soil for building. Also located within the natural constraint area is the 109-acre Huffman Prairie Flying Field containing remnant prairie habitat, which includes several rare plant and animal species.

Human-made constraints also restrict development within the WPAFB boundaries. Included in these types of constraints are archaeological sites and historic buildings, which can be identified sites or those that remain undiscovered. Operational restrictions can also impede development. Noise contours from aircraft operations and explosive safety zones must be considered when looking at developing areas on the Base. Airfield and airspace control surfaces, such as runway approach CZs, are to remain clear of building obstructions. The presence of past waste disposal sites and fire training areas must be considered when siting facilities (WPAFB 1995a).

Surrounding Land Use

Land uses around WPAFB vary from heavily urbanized to rural agricultural (**Figure 3-1**). Most of the urbanized areas are west of the Base, with the low-density or agricultural area located east of the Base.

To the west and south of WPAFB is the Dayton metropolitan area. This area is comprised of higher population density cities such as Dayton, Huber Heights, Riverside, Fairborn, and Beavercreek. These cities, along with WPAFB, are within Greene and Montgomery counties. According to the most recent census data, Greene County has a population of 147,886 persons while Montgomery County has 559,062 persons (Census 2010a). To the east and north of WPAFB is largely open area with agricultural lands interspersed with low-density development located within Miami and Clark counties. According to the most recent census data, Miami County has a population of 98,868 persons while Clark County has 144,741 persons (Census 2010a).

Most of the land surrounding WPAFB that is impacted from Base activities is compatible with Base operations. Many factors contribute to the compatibility of land uses that are within Base activity areas. Development patterns and services available encourage or restrict development in many areas outside incorporated cities, and many areas immediately surrounding the Base are development-restricted due to floodplains or well water protection restrictions. Progressive land use controls have been the most important factor concerning compatible development within noise and APZs at WPAFB (WPAFB 1995a).

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Legend:

- Clear Zones
- APZ I
- APZ II
- Installation Area
- Runways
- Maximum Mission DNL Noise Contours
- Residential
- Commercial
- Industrial
- Institutional
- Open Space
- Vacant and Agricultural
- Extractive (Mining/Quarry)
- Airports

Source: 1995 AICUZ Study Maximum Mission

Source: Land Use - Ohio Department of Natural Resources Montgomery County Land Use data; Miami County Land Use Data; Clark County Land Use data; Greene County Land Use data.

N

Feet

0 3,000 6,000 12,000

WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 3-1
Existing Land Use and
Maximum Mission Noise Contours
at WPAFB

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Land use in the area of the NMUSAF is classified as Airports and Institutional. The project area is not located within APZ I, APZ II, or CZs (**Figure 3-1**).

3.2 Air Quality

3.2.1 Definition of the Resource

In accordance with Federal Clean Air Act (CAA) requirements, the air quality in a given region or area is measured by the concentration of various pollutants in the atmosphere. The measurements of these "criteria pollutants" in ambient air are expressed in units of parts per million (ppm) or in units of micrograms per cubic meter ($\mu g/m^3$). The air quality in a region is a result not only of the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface topography, the size of the "air basin," and the prevailing meteorological conditions.

The CAA directed the U.S. Environmental Protection Agency (USEPA) to develop, implement, and enforce strong environmental regulations that would ensure clean and healthy ambient air quality. To protect public health and welfare, the USEPA developed numerical concentration-based standards, or National Ambient Air Quality Standards (NAAQS), for pollutants that have been determined to impact human health and the environment. USEPA established both primary and secondary NAAQS under the provisions of the CAA. The NAAQS are currently established for six criteria air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (including particulates equal to or less than 10 microns in diameter [PM_{10}] and particulates equal to or less than 2.5 microns in diameter [$PM_{2.5}$]), and lead (Pb).

The primary NAAQS represent maximum levels of background air pollution that are considered safe, with an adequate margin of safety to protect public health. Secondary NAAQS represent the maximum pollutant concentration necessary to protect vegetation, crops, and other public resources along with maintaining visibility standards. **Table 3-1** presents the primary and secondary NAAQS.

The criteria pollutant O_3 is not usually emitted directly into the air, but is formed in the atmosphere by photochemical reactions involving sunlight and previously emitted pollutants or "O_3 precursors." These O_3 precursors consist primarily of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) that are directly emitted from a wide range of emissions sources. For this reason, regulatory agencies attempt to limit atmospheric O_3 concentrations by controlling VOC pollutants (also identified as reactive organic gases) and NO_x.

Table 3-1. National Ambient Air Quality Standards

Pollutant	Standard Value [6]		Standard Type
Carbon Monoxide (CO)			
8-hour average	9 ppm	(10 mg/m^3)	Primary
1-hour average	35 ppm	(40 mg/m^3)	Primary
Nitrogen Dioxide (NO_2)			
Annual arithmetic mean	0.053 ppm	(100 µg/m^3)	Primary and Secondary
1-hour average[1]	0.100 ppm	(188 µg/m^3)	Primary and Secondary
Ozone (O_3)			
1-hour average[2]	0.12 ppm	(235 µg/m^3)	Primary and Secondary
8-hour average[2]	0.075 ppm	(147 µg/m^3)	Primary and Secondary
Lead (Pb)			
3-month average[3]		0.15 µg/m^3	Primary and Secondary
Particulate < 10 micrometers (PM_{10})			
24-hour average[4]		150 µg/m^3	Primary and Secondary
Particulate < 2.5 micrometers ($PM_{2.5}$)			
Annual arithmetic mean[4]		15 µg/m^3	Primary and Secondary
24-hour average[4]		35 µg/m^3	Primary and Secondary
Sulfur Dioxide (SO_2)			
1-hour average[5]	0.075 ppm	(196 µg/m^3)	Primary
Annual arithmetic mean[5]	0.03 ppm	(80 µg/m^3)	Primary
24-hour average[5]	0.14 ppm	(365 µg/m^3)	Primary

Notes:

1 In February 2010, USEPA established a new 1-hr standard at a level of 0.100 ppm, based on the 3-year average of the 98th percentile of the yearly distribution concentration, to supplement the existing annual standard.

2 In March 2008, the USEPA revised the level of the 8-hour standard to 0.075 ppm. With regards to the secondary standard for O_3, USEPA revised the current 8-hour standard by making it identical to the revised primary standard.

3 In November 2008, USEPA revised the primary lead standard to 0.15 µg/m^3. USEPA revised the averaging time to a rolling 3-month average.

4 In October 2006, USEPA revised the level of the 24-hour $PM_{2.5}$ standards to 35 µg/m^3 and retaining the level of the annual $PM_{2.5}$ standard at 15 µg/m^3 and retaining the level of the annual $PM_{2.5}$. With regard to primary standards for particle generally less than or equal to 10 µm in diameter (PM_{10}), USEPA is retaining the 24-hour standard and revoking the annual PM_{10} standard.

5 In June 2010, USEPA established a new 1-hr SO_2 standard at a level of 75 parts per billion (ppb), based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. The USEPA is also revoking both the existing 24-hour and annual primary SO_2 standards.

6 Parenthetical value is an approximately equivalent concentration for NO_2, O_3 and SO_2.

ppb = parts per billion ; µg/m^3 (micrograms per cubic meter)
ppm = parts per million; mg/m^3 (milligrams per cubic meter)
mg/m^3 = milligrams per cubic meter
µg/m^3 = micrograms per cubic meter

The USEPA has recognized that particulate matter emissions can have different health affects depending on particle size and, therefore, developed separate NAAQS for coarse particulate matter PM_{10} and fine particulate matter $PM_{2.5}$. The pollutant $PM_{2.5}$ can be emitted from emission sources directly as very fine dust and/or liquid mist or formed secondarily in the atmosphere as condensable particulate matter typically forming nitrate and sulfate compounds. Precursors of condensable $PM_{2.5}$ can include SO_2, NO_x, VOC, and ammonia. Secondary (indirect) emissions vary by region depending upon the predominant emission sources located there and thus which precursors are considered significant for $PM_{2.5}$ formation and identified for ultimate control.

The CAA and USEPA delegated responsibility for ensuring compliance with NAAQS to the states and local agencies. As such, each state must develop air pollutant control programs and promulgate regulations and rules that focus on meeting NAAQS and maintaining healthy ambient air quality levels. These programs are detailed in State Implementation Plans (SIPs) that must be developed by each state or local regulatory agency and approved by the USEPA. A SIP is a compilation of regulations, strategies, schedules, and enforcement actions designed to move the state into compliance with all NAAQS. Any changes to the compliance schedule or plan (e.g., new regulations, emissions budgets, controls) must be incorporated into the SIP and approved by the USEPA.

The CAA required that the USEPA draft general conformity regulations. These regulations are designed to ensure that Federal actions do not impede local efforts to achieve or maintain attainment with the NAAQS. The General Conformity Rule and the promulgated regulations found in 40 CFR 93 exempt certain Federal actions from conformity determinations (e.g., contaminated site cleanup and natural disaster response activities). Other Federal actions are assumed to conform if total indirect and direct project emissions are below *de minimis* levels presented in 40 CFR 93.153. The threshold levels (in tons of pollutant per year) depend upon the nonattainment status that USEPA has assigned to a region. Once the net change in nonattainment pollutants is calculated, the Federal agency must compare them to the *de minimis* thresholds.

In 1997, the USEPA initiated work on new General Conformity rules and guidance to reflect the new 8-hour O_3, $PM_{2.5}$, and regional haze standards that were promulgated in that year. Because of the litigation and resulting delay in implementing the new O_3 and $PM_{2.5}$ ambient air quality standards, however, these new conformity requirements were not completed by the USEPA until 2006 when the $PM_{2.5}$ *de minimis* levels were added. The last revision of the General Conformity rules occurred in April 2010. The USEPA rule in this latest revision sought to clear up identified issues, reduce specific regulatory burdens, and modify the rules to be helpful to states revising their SIP for implementing the revised NAAQS while assuring Federal agency actions continue to conform. Several of the burden reduction measure changes made to the General Conformity applicability in 40 CFR 93.153 includes:

- Deleting the provision that requires Federal agencies to conduct a conformity determination for regionally significant actions where the direct and indirect emission of any pollutant represent 10 percent or more of a nonattainment or maintenance area's emission inventory even though the total direct and indirect emissions are below *de minimis* levels.
- Adding new types of actions that Federal Agencies can include in their "presumed to conform" lists and permitting States to establish in their General Conformity SIPs "presumed to conform" lists for actions within their State.
- Finalizing an exemption for the emissions from stationary sources permitted under the minor source New Source Review (NSR) programs similar to the USEPA's existing General Conformity regulation which already provides for exemptions for emissions from major NSR sources.

- Establishing procedures to follow in extending the 6-month conformity exemption for actions taken in response to an emergency.

Title V of the CAA Amendments of 1990 requires states and local agencies to implement permitting programs for major stationary sources. A major stationary source is a facility (e.g., plant, base, or activity) that has the potential to emit more than 100 tons annually of any one criteria air pollutant, 10 tons per year (tpy) of a hazardous air pollutant, or 25 tpy of any combination of hazardous air pollutants. However, lower pollutant-specific "major source" permitting thresholds apply in nonattainment areas. For example, the Title V permitting threshold for an "extreme" O_3 nonattainment area is 10 tpy of potential VOC or NO_x emissions. The purpose of the permitting rule is to establish regulatory control over large, industrial-type activities and monitor their impact on air quality.

Federal Prevention of Significant Deterioration (PSD) regulations also define air pollutant emissions from proposed major stationary sources or modifications to be "significant" if a proposed project's net emission increase meets or exceeds the rate of emissions listed in 40 CFR 52.21(b)(23)(i); or (1) a proposed project is within 10 kilometers of any Class I area, and (2) regulated pollutant emissions would cause an increase in the 24-hour average concentration of any regulated pollutant in the Class I area of 1 $\mu g/m^3$ or more [40 CFR 52.21(b)(23)(iii)]. The PSD regulations also define ambient air increments, limiting the allowable increases to any area's baseline air contaminant concentrations, based on the area's designation as Class I, II, or III [40 CFR 52.21(c)].

3.2.2 Existing Conditions

Regional Climate

The climate of this region of Ohio is humid and temperate with warm summers and cold winters. Average minimum and maximum temperatures are between 21 and 36 degrees Fahrenheit (°F) in January and 45 and 85 °F in July. The average annual precipitation is 38.43 inches, with June typically being the wettest month and October the driest month. The prevailing winds are from the southwest, with average monthly wind speeds between 3 and 7 knots.

Regional Air Quality

Under the authority of the CAA and subsequent regulations, the USEPA has divided the country into geographical regions known as Air Quality Control Regions (AQCRs) to evaluate compliance with the NAAQS. Through the CAA, Congress has stated that the prevention and control of air pollution belongs at the state and local level, thus the USEPA has delegated enforcement of the PSD and Title V programs to the Ohio Environmental Protection Agency (OEPA). The OEPA has adopted the NAAQS by reference, thereby requiring the use of the standards within the State of Ohio.

Wright-Patterson AFB

The Base is located in Greene and Montgomery counties, which are located in the Metropolitan Dayton Intrastate AQCR (40 CFR 81.34). Each AQCR is classified as an attainment area or nonattainment area

for each of the criteria pollutants depending on whether it meets or fails to meet the NAAQS for the pollutant. Ambient air quality for the Metropolitan Dayton Intrastate AQCR, which was formerly classified as a maintenance area for the 1-hour and 8-hour O_3, is not yet designated for the new 8-hour O_3 NAAQS established in 2008.

Ambient air quality, which was classified as attainment for the NO_2 annual standard, was designated as unclassifiable/attainment effective on February 29, 2012 for the new 1-hour standard established in 2010 (USEPA 2012). Ambient air quality for SO_2 is not yet designated for the new 1-hour standard established in 2010. Ambient air quality for Pb, which was in attainment for the previous quarterly standard, is not yet designated for the new rolling 3-month standard established in 2008. The ambient air quality for $PM_{2.5}$ is classified as attainment for the 24-hour standard and nonattainment for the annual standard. The region is designated as an unclassifiable/attainment area for all other criteria pollutants. Unclassifiable areas are those areas that have not had ambient air monitoring and are assumed to be in attainment with NAAQS. Any of the pending attainment designations have no regulatory effect on the current analysis.

Air quality is typically good in the vicinity of WPAFB, and is generally affected only locally by military and civilian vehicle emissions, particulate pollution from vehicle traffic, emissions from wastewater treatment plants, industrial sources, and construction activities. Mobile sources, such as vehicle and aircraft emissions, are generally not regulated and are not covered under existing stationary source permitting requirements. Stationary emissions sources at WPAFB include natural gas and coal-fired boilers; research and development sources, such as laboratory fume hoods and test cells; paint spray booths; refueling operations; and emergency power generators.

The Base is under the jurisdiction of USEPA Region 5 and the OEPA. The Regional Air Pollution Control Agency (RAPCA), under the jurisdiction of the OEPA, conducts annual compliance inspections at WPAFB. The Base has long had an aggressive program of internal audits and inspections to ensure continual compliance with all applicable air permit terms and conditions. Detailed records are maintained to demonstrate compliance with emission limits, and reports are submitted in a timely manner to the local regulatory agency.

The WPAFB air emissions inventory includes over 1,400 emissions sources. Of these, approximately 1,050 are included in the Base's Title V permit application, which was originally submitted to the OEPA in February 1996 in accordance with CAA requirements. Many of the Title V sources are insignificant, including emergency generators and laboratory fume hoods. There were 29 permitted non-insignificant emissions units identified in the original application, most of which were boilers and paint spray booths. The OEPA finalized the Title V Operating Permit for WPAFB in January 2004 with an effective date of February 17, 2004 (OEPA 2004). A Title V renewal permit application was submitted to the OEPA in May 2008 and is currently under review. The Title V renewal application notified OEPA that the number of permitted non-insignificant emission units was reduced from 29 to 26.

Area B at WPAFB is primarily dedicated to research and development facilities. The NMUSAF public displays are located in the unsecured section of Area B in Facilities 20487, 20489, and 20494. Museum restoration and storage activities occur in seven different buildings located on the secured portion of Area B. A number of insignificant emissions units located within Area B associated with museum activities and facilities are listed in the WPAFB Title V permit, identified on the Title V renewal application, or listed in the OEPA Air Services profile. Facilities 20487, 20489, and 20494 insignificant activities include the following: one emergency backup generator and five natural gas boilers.

The insignificant activities associated with the restoration activities and storage facilities include the following: three emergency backup generators, six abrasive cleaners, 11 paint booths/painting activities, ten fume hoods, five cold cleaners, and seven metal/woodworking activities.

Insignificant sources listed in the Title V permit may or may not have permit conditions or reporting requirements depending on the regulatory qualifications that categorizes a source as insignificant. Insignificant sources that were specifically issued a Permit-to-Install (PTI) must be evaluated individually prior to commencing work to assure that the terms and conditions of the issued PTI are maintained. Insignificant sources that were permitted-by-rule (PBR) may be modified or relocated without notification provided the terms and conditions of the PBR are maintained. Insignificant sources that are *de minimis* or to which only generally applicable requirements apply may undergo additions, removals, and relocations and do not require a modification of the Title V permit provided the changes do not exceed insignificant emission levels.

Insignificant emission levels are defined in Ohio Administrative Code (OAC) rule 3745-77-01(V)(3) to be less than or equal to 5 tpy of any regulated air pollutant other than a Hazardous Air Pollutant and not more than 20 percent of an applicable major source threshold. Changes to insignificant sources are handled as routine administrational changes through air profile updates submitted through Air Services to the OEPA, Division of Air Pollution Control.

An Air Conformity Applicability Analysis was prepared for the Proposed Action. This analysis is discussed in Section 4 and provided in **Appendix C**.

3.3 Noise

3.3.1 Definition of the Resource

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Human response to noise varies according to the source type, characteristics of the noise source, distance between source and receptor, receptor sensitivity, and time of day. Sound is measured with instruments that record instantaneous sound levels in decibels (dB). Decibels are used to characterize sound levels that can be sensed by the human ear. "A-weighted" decibels (dBA) incorporate an adjustment of the frequency content of a noise event to represent the way

in which the average human ear responds to the noise event. All sound levels analyzed in this EA are A-weighted.

Single-event noise, such as an overflight, is described by the sound exposure level (SEL). Cumulative noise levels, resulting from multiple single-events, are used to characterize community noise effects from aircraft or airfield environment, and are measured in the DNL metric, as described in Section 3.1.1. A general discussion of these metrics is provided below and a detailed explanation is provided in **Appendix D**.

Sound Exposure Level

The SEL measurement describes a noise event, such as an aircraft overflight, comprising a period of time when an aircraft is approaching a receptor and noise levels are increasing, the instant when the aircraft is closest to the receptor and the maximum noise level is experienced, and the period of time when the aircraft moves away from the receptor resulting in decreased noise levels. An SEL is a measure that accounts for both loudness and duration of a noise event.

The SEL metric relates to a single event, which is useful when calculating the noise effects of aircraft flyovers. Frequency, magnitude, and duration vary according to aircraft type, engine type, and power setting. Therefore, individual aircraft noise data are collected for various types of aircraft and engines at different power settings at various phases of flight. These values form the basis for the individual-event noise descriptors at any location, and are adjusted to the location by applying appropriate corrections for temperature, humidity, altitude, and variations from standard aircraft operating profiles and power settings. **Table 3-2** provides SEL values at various altitudes for aircraft operating directly over head at various speeds and power settings depending on aircraft type (values in the table represent averages).

Table 3-2. SEL dB Values for Aircraft Operating in the Vicinity of WPAFB

Altitude (feet AGL)	C-5 [1]	C-17 [1]	KC-135R [1]	F-16C [1]
200	118.5	107.6	102.3	100.9
500	111.7	100.2	95.9	94.4
1,000	105.8	93.4	90.8	89.0
2,000	98.9	85.1	85.1	82.9
3,150	93.4	79.1	80.8	78.4
5,000	86.5	73.0	76.0	73.3

Day based on steady, level flight , using Omega 10.9 aircraft profile data from actual overflight noise measurements; Omega 10.9 is a standalone DoD noise-modeling program that allows the user to retrieve data from the NOISEMAP database; AGL = above ground level.

Day-Night Average A-Weighted Sound Level

The DNL noise metric incorporates a "penalty" for nighttime noise events to account for increased annoyance. The DNL is the energy-averaged sound level measured over a 24-hour period, with a 10 dB penalty assigned to noise events occurring between 10:00 p.m. and 7:00 a.m. The DNL values are obtained by averaging aircraft single event SEL values for a given 24-hour period.

The DNL is the preferred noise metric of U.S. Department of Housing and Urban Development (HUD), Federal Aviation Administration (FAA), USEPA, and DoD for modeling aircraft noise in airport environs.

Most people are exposed to sound levels of DNL 50 to 55 dBA or higher on a daily basis. Studies specifically conducted to determine noise impacts on various human activities show that about 90 percent of the population is not significantly bothered by outdoor sound levels below DNL of 65 dBA (U.S. Department of Transportation [USDOT] 1980).

Studies of community annoyance in response to numerous types of environmental noise show that DNL correlates well with impact assessments and that there is a consistent relationship between DNL and the level of annoyance. The "Schultz Curve" (discussed in **Appendix D)** shows the relationship between DNL noise levels and the percentage of the population predicted to be highly annoyed.

Noise Criteria and Regulations

Federal and local governments have established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise. Guidelines and regulations that are relevant to the project are described below.

According to USAF, FAA, and HUD criteria, residential units and other noise-sensitive land uses are "clearly unacceptable" in areas where the noise exposure exceeds DNL of 75 dBA, "normally unacceptable" in regions exposed to noise between the DNL of 65 to 75 dBA, and "normally acceptable" in areas exposed to noise where the DNL is 65 dBA or less. The Federal Interagency Committee on Noise developed land-use compatibility guidelines for noise in terms of DNL (USDOT 1980). The DNL is the metric used by the USAF in determining noise impacts of military airfield operations for land use planning.

The USAF land use compatibility guidelines (relative to DNL values) are documented in the *AICUZ Program Handbook* (USAF 1999). Four noise zones are used in AICUZ studies to identify noise impacts from aircraft operations. These noise zones range from DNL of 65 to 80 dBA and above. For example, it is recommended that no residential uses, such as homes, multifamily dwellings, dormitories, hotels, and mobile home parks, be located where the noise is expected to exceed a DNL of 65 dBA.

If sensitive structures are located in areas within a DNL of 65 to 75 dBA, noise-sensitive structures should be designed to achieve a DNL of 25 to 30 dBA interior noise reduction. Noise-sensitive structures might include schools, concert halls, hospitals, and nursing homes. Elevated noise levels in these structures can interfere with speech, causing annoyance or communication difficulties. Some commercial and industrial uses are considered acceptable where the noise level exceeds DNL of 65 dBA. For outdoor activities,

USEPA recommends DNL of 55 dBA as the sound level below which there is no reason to suspect that the general population will be at risk from any of the effects of noise (USEPA 1974).

Response to Noise Events

Noise can cause a person to be irritated or annoyed. Noise annoyance is defined by USEPA as any negative subjective reaction to noise by an individual or group. The DNL is an accepted unit for quantifying annoyance to humans by general environmental noise, including aircraft noise. **Table 3-3** describes the percentage of people who were "highly annoyed" when exposed to various levels of noise measured in DNL. The data shown provides a perspective on the level of annoyance that might be anticipated. For example, 15 to 25 percent of persons exposed on a long-term basis to DNL of 65 to 69 dBA are expected to be highly annoyed by noise events.

Table 3-3. Percentage of Population Highly Annoyed by Noise Zones

DNL	Percentage of Persons Highly Annoyed	
	Low	High
65–69 dBA	15	25
70–74 dBA	25	37
75–79 dBA	37	52
80 + dBA	61	61

Source: USAF 2000

Notes: dBA = A-weighted decibel; DNL = Day-Night Average A-Weighted Sound Level

The effects of noise on sleep are of concern, primarily in ensuring suitable residential environments. The DNL incorporates consideration of sleep disturbance by assigning a 10 dBA penalty to nighttime noise events (10:00 p.m. to 7:00 a.m.). More typically, single noise events, not average sound levels, correlate with sleep disturbance. A discussion of the relationships between the occurrence of awakening and SEL is presented in **Appendix D**. Most of these relationships do not reflect habituation and, as such, do not address long-term sleep disturbance effects. Nevertheless, the studies can be used to demonstrate relative differences in interference among different noise-event exposure scenarios.

3.3.2 Existing Conditions

Aircraft Operations

Existing noise contours were analyzed using results from DoD-approved noise models in the vicinity of WPAFB. The noise contour analysis for WPAFB is presented in the *1995 AICUZ Study for Wright-Patterson AFB, Ohio* (WPAFB 1995a). Based on reasonable assumptions at the time of the 1995 AICUZ Study, a Maximum Mission/Maximum Capacity Scenario was analyzed and incorporated a potential increase in F-16, F-15, C-141, and C-5 aircraft operations. Although other aircraft have been utilized at WPAFB, the Maximum Mission Model was intended to capture the maximum feasible operational capacity of the airfield and support activities. Within the limits of accuracy of the model itself, it was meant to provide a good-faith "worst-case" baseline for the surrounding communities' zoning and land-

use decisions, thus limiting encroachment and preserving the capacity of the Base to host additional flying missions.

The most recent noise study for WPAFB was conducted in 2008 to confirm that C-5 aircraft noise levels were within the Maximum Mission/Maximum Capacity Scenario. This analysis confirmed that noise levels were within the Maximum Mission/Maximum Capacity contours established in 1995 (WPAFB 2011a). Since then, the 445 Airlift Wing (AW) has replaced the C-5 aircraft with the C-17. The conversion of the C-5 to the C-17 occurred throughout FY11 and is now complete. The C-17 is a newer and more flexible airlift aircraft. Due to a quieter engine, the noise levels in the vicinity of WPAFB have been reduced and are also within the Maximum Mission/Maximum Capacity Scenario. Because the Maximum Mission Scenario noise contours have been, and are currently, used for noise compatibility planning around the Base, these contours are used as the baseline for the noise analysis in this EA. **Figure 3-1** depicts the baseline noise contours presented in the 1995 AICUZ Study (WPAFB 1995a).

No noise-sensitive receptors were identified in the AICUZ. There have been no recent complaints regarding aircraft noise. Aircrews limit their routes to the south and east as much as possible.

According to the AICUZ study, the NMUSAF is located within the 65 to 75 dB noise zones. These ranges represent existing conditions to which potential noise levels from construction activities associated with addition to the NMUSAF can be compared.

3.4 Geology and Soils

3.4.1 Definition of the Resource

Geological resources consist of the earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of topography, soils, geology, minerals, and, where applicable, paleontology. Topography pertains to the general shape and arrangement of a land surface, including its height and the position of its natural and human-made features.

Geology is the study of the earth's composition and provides information on the structure and configuration of surface and subsurface features. Such information derives from field analysis based on observations of the surface and borings to identify subsurface composition. Hydrogeology extends the study of the subsurface to water-bearing structures. Hydrogeological information helps in the assessment of groundwater quality and quantity and its movement.

Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect

their abilities to support certain applications or uses. In appropriate cases, soils properties must be examined for their compatibility with particular construction activities or types of land use.

3.4.2 Existing Conditions

Topography and Geology

The topography of the NMUSAF is relatively flat and is approximately 790 ft above ground surface. The highest elevations on the Base are in Area B and occur along a bedrock ridge that extends from the southeast corner of Area B to the Wright Memorial. The majority of the base is on the broad alluvial plain of the Mad River Valley, which overlies Ordovician-age Richmond shale and limestone bedrock (WPAFB 2001). The land surface elevation on Base ranges from approximately 760 to 980 ft above mean sea level (MSL) (WPAFB 2001).

The Base is within the glaciated till plain region of southwestern Ohio, an area within the Central Lowlands Physiographic Province. The Central Lowlands province is characterized by low rolling hills, level plains, and flat alluvial valleys (WPAFB 2011b).

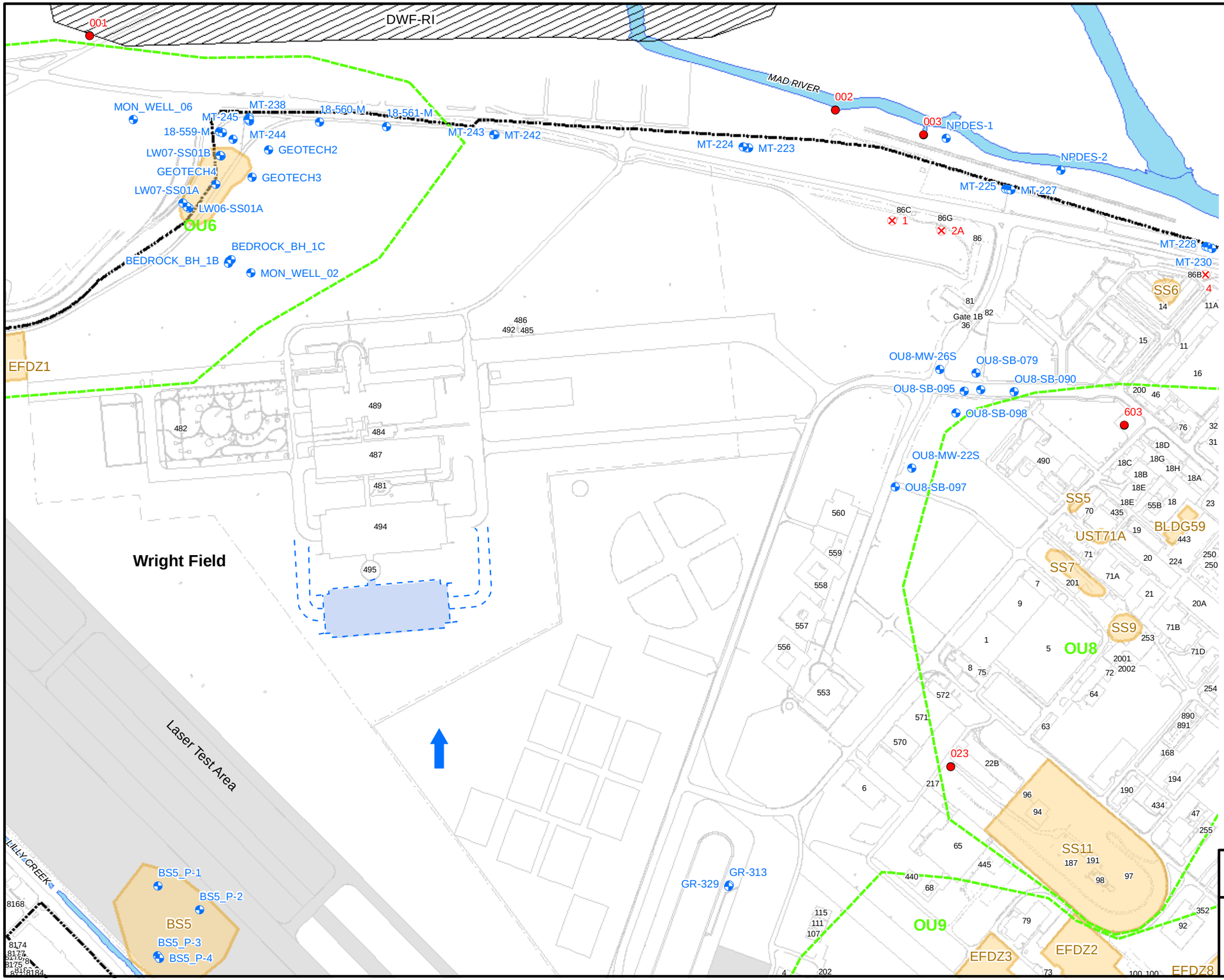
Natural Hazards

The state of Ohio is characterized by a low level of seismic activity (U.S. Geological Survey [USGS] 2010). The Dayton, Ohio, area does not typically experience earthquakes because of its location in relation to fault zones (Hansen 2002). Northwest Ohio had a series of historic earthquakes in the late 1800s to mid 1900s. The majority of these earthquakes were located in Auglaize and Shelby counties, which are approximately 45 miles from Greene County, Ohio (Hansen 2002), with the greatest instrumented magnitude recorded between 5.0 and 5.4 (USGS 2010). On July 23, 2010, a 5.0 magnitude earthquake originating along the Quebec-Ontario border was felt in Dayton and surrounding areas.

Soils

Surface soil at WPAFB formed on unconsolidated deposits, primarily alluvium, glacial outwash, glacial till, and loess (WPAFB 2011b). Development and substantial earthmoving activities have altered the natural soil characteristics at WPAFB, making precise classifications difficult. The U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) mapped most of WPAFB as urban land complexes.

Soil profiles for the proposed site of Hangar 4 were compiled from borings logged during various investigations conducted in the immediate vicinity of the project site including a geothermal testing report titled, *Geotechnical Data Report – Final, Air Force Museum Hangar 4* (BBC&M 2011). A soil profile was also determined from data obtained from wells installed by the USGS that included well identification MT-133 (**Figure 3-2**) and well identification BS5-P1 (USGS 1993). Soil data was also obtained from a site investigation of Burial Sites 5 and 6 in 1998 (ICI 1998). Soil profiles in the area of the proposed Hangar 4 construction site include those listed in **Table 3-4**:



Legend

- Monitoring Well Locations
- WPAFB Drinking Water Well Locations
- Storm Sewer NPDES Outfall
- Groundwater Flow Direction
- Installation Area
- Operable Units
- ERP Sites
- Proposed Location of NMUSAF Addition

Well Field Source Water Aquifer Recharge

- 1 Year Travel Time
- 5 Year Travel Time

Notes:

BS - Burial Site

DWF-RI - Dayton Well Field/Rohrer's Island

EFDZ - Earthfill Disposal Site

IRP - Installation Restoration Program

SS - Spill Site

UST - Underground Storage Tank

WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 3-2
Wells, ERP Sites, and Surface Water in the NMUSAF Project Area

Table 3-4. Soil Profile for the Proposed NMUSAF Addition Construction Site

Depth (bgs)	Soil Description
0 to 3 ft	Topsoil
3 to 30 ft	Upper sand unit; glacial outwash deposits (fine to medium-grained soil) present beneath surficial soil layer
30 to 34 ft	Upper clay unit with some thin (0.5 ft) medium-grained sand stringers
34 to 155 ft	Gravel
155 to 157 ft	Gray clay layer with some gravel
157 to 200 ft	Sand layer; course-grained sand with gravel
200 to 210 ft	Clay with some sand stringers
210 to 221 ft	Lowest sand unit; olive-gray medium-grained silty sand occurring immediately above the shale bedrock

bgs = below ground surface
Source: Geotechnical Data Report (BBC&M 2011)

According to the BBC&M 2011 geotechnical study completed for the NMUSAF, the ground-bearing capacity at the proposed construction site is assumed to be suitable because there are no known structural problems with the existing museum buildings.

3.5 Water Resources

3.5.1 Definition of the Resource

Water resources include groundwater, surface water, and floodplains. Evaluation of water resources examines the quantity and quality of the resource and its demand for various purposes.

Groundwater

Groundwater consists of the subsurface hydrologic resources. It is an essential resource often used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater typically can be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, and recharge rate.

Surface Water

Surface water resources consist of lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. Storm water is an important component of surface water systems because of its potential to introduce sediments and other contaminants that could degrade lakes, rivers, and streams. Storm water flows, which may be exacerbated by high proportions of impervious surfaces associated with buildings, roads, parking lots, and airfields are important to the management of surface water. Storm water systems convey precipitation away from developed sites to appropriate receiving surface waters. Higher densities of development, such as those found in Area B, require greater degrees of storm water management because of the higher proportions of impervious surfaces that occur in urban centers.

Floodplains

Floodplains are areas of low-level ground present along rivers, stream channels, or coastal waters. Such lands might be subject to periodic or infrequent inundation due to rain or melting snow. Flood potential is evaluated by the Federal Emergency Management Agency (FEMA), which defines the 100-year floodplain. The 100-year floodplain is the area that has a one percent chance of inundation by a flood event in a given year.

Executive Order 11988, *Floodplain Management*, requires Federal agencies to determine whether a proposed action would occur within a floodplain. This determination typically involves consultation of appropriate FEMA Flood Insurance Rate Maps, which contain enough general information to determine the relationship of the project area to nearby floodplains. Executive Order 11988 directs Federal agencies to avoid floodplains unless the agency determines that there is no practicable alternative. Where the only practicable alternative is to site in a floodplain, a specific step-by-step process must be followed to comply with EO 11988 outlined in the FEMA document *Further Advice on EO 11988 Floodplain Management*. As a planning tool, the NEPA process incorporates floodplain management through analysis and public coordination of the EA.

All floodplain related construction activities must be coordinated with the MCD for approval. The MCD through the *Land Use Agreement* (dated January 7, 2000) and the MCD *Policy and Procedure for Permits in Retarding Basins* regulates all construction on land within the Huffman Dam Retardation Basin and more than 5 ft below the spillway elevation of 835 ft, above MSL.

3.5.2 Existing Conditions

Groundwater

The Base is regionally located in the Great Miami River Valley, which is filled with glacial deposits of sand and gravel. The glacial outwash deposits are very permeable and exhibit high transmissivity and hydraulic conductivity. The resulting aquifer system, collectively called the Miami Valley Buried Aquifer, is a highly productive source of water for the millions of people in southwest Ohio. The USEPA designated the Miami Valley Buried Aquifer system as a sole-source aquifer in 1988, meaning that all new projects must be approved by USEPA Region 5 to ensure its continued use as a drinking water supply (53 Federal Register 15876). The buried aquifer system provides drinking water for more than 1.6 million people in southwest Ohio (Debrewer et al. 2000).

Groundwater can also be found in large volumes in the Silurian-age (415 to 465 million years ago) limestone and dolomite bedrock underneath the buried valley aquifer system. Private wells and smaller public systems typically use this bedrock aquifer because, though not as productive as the buried aquifer, it is adequate for such uses (MCD 2002). Underneath the limestone and dolomite bedrock is Ordovician-age (465 to 510 million year ago) bedrock shales and limestones of the Richmond Group. The lower

bedrock aquifer system generally produces less than 5 gallons per minute (gpm) and is only productive enough for livestock use.

The buried valley aquifers coincide with the present Great Miami River and its tributaries. Water underground generally follows the same flows as surface waters with upland areas serving as recharge areas and groundwater divides (MCD 2002). At WPAFB, the Mad River follows the course of the Mad River Buried Aquifer, part of the Miami Valley Buried Aquifer system. South of Huffman Dam (a flood control dam that is managed by the MCD), a till zone divides the Mad River Buried Aquifer into an upper water table unit and a lower confined unit. However, north of the dam and in other parts of the buried valley aquifer, till zones occur less frequently as discontinuous, less-permeable zones within the more permeable outwash deposits (WPAFB 1995b).

Vertical hydraulic gradients vary throughout the area, and both upward and downward gradients have been recorded in nested monitoring wells at WPAFB. Most of the wells in the outwash deposits yield between 750 and 1,500 gallons per minute (gpm), but can vary from less than 200 to more than 4,000 gpm (WPAFB 1995b). The City of Dayton groundwater production wells at Huffman Dam are screened at depths of over 100 ft below ground surface. Groundwater at WPAFB is typically hard due to the limestone and dolomite bedrock (Debrewer et al. 2000).

The proposed NMUSAF addition would be located approximately 2,000 ft downgradient of Burial Site 5 (BS5) (**Figure 3-2**). BS5 and potential hazardous waste disposal activities were investigated during a Site Investigation (SI) for Burial Sites 5 and 6 (ICI 1998). It was determined that no actual waste burial activities were conducted at the site. However, a groundwater plume of tetrachloroethylene (PCE) was discovered near the Base's southern boundary with the potential source of the PCE located off-Base near a strip mall. There are no further remedial actions associated with the BS5 soils (WPAFB 1998). Groundwater at BS5 continues to be monitored under the Groundwater Operable Unit and the Long-term Groundwater Monitoring (LTM) Program.

While no groundwater monitoring wells sampled under the LTM Program exist at the proposed site of Hangar 4, a geotechnical investigation conducted by BBC&M Engineering, Inc. indicates that four piezometers were installed to measure groundwater (**Figure 3-2**). From these piezometers, it was determined that the depth to the water table ranged from approximately 19 to 22 ft bgs. Based on surrounding monitoring wells previously installed during the Operable Unit 6 (OU6) and OU8 Remedial Investigation (RIs), and the USGS groundwater monitoring program wells, groundwater flow though the project area is to the north and toward the City of Dayton's well field at Rohrer's Island and the WPAFB Area B drinking water supply wells (**Figure 3-2**).

The proposed location of Hangar 4 is not located within the WPAFB well-field protection area. As seen on **Figure 3-2**, the northeastern end of the proposed site for Hangar 4 is located approximately 700 ft west

of the five-year travel time zone that recharges the aquifer that supplies the Area B water supply wells (Tetra Tech 2007). During the design phase of the proposed project, coordination with 88 ABW/CEANQ would be required to determine any construction or operation restriction to protect the underlying groundwater resource in this area.

Surface Water

The Base is in the Mad River Valley. The Mad River originates approximately 40 miles north of Springfield, Ohio, and flows south and southwest past WPAFB to its confluence with the Great Miami River in Dayton, Ohio. The Great Miami River flows into the Ohio River, which flows into the Mississippi River. Sustained flow of the Mad River originates from groundwater discharge of glacial deposits upstream of Huffman Dam. The Mad River approaches WPAFB from the north and flows along the western border of Area A (**Figure 3-2**). The OEPA has divided the Mad River watershed into five areas: the headwaters; Mad River between Kings and Chapman Creeks; Buck Creek; Mad River from Chapman to Mud Creeks; and the lower Mad River (Mud Creek to the Great Miami River). Mud Creek enters the Mad River 2,000 feet due north of the SR 235 bridge, near the northwest corner of Area A. The Base lies adjacent to the northernmost portion of the lower Mad River segment.

The OEPA has determined that segments of the Mad River watershed do not support designated aquatic life uses for Warmwater Habitat, Modified Warmwater Habitat, Coldwater Habitat, or the Primary Contact Recreational use (OEPA 2009). Specifically, OEPA has identified the lower segment of the Mad River, which flows through WPAFB, as an impaired water under Section 303(d) of the Clean Water Act (CWA) for not meeting aquatic life and recreation use standards (OEPA 2010).

The USEPA has established the total maximum daily load of effluent (TMDL) for the Mad River in the *Mad River Total Maximum Daily Loads for Sediment and Turbidity* (USEPA 2007). A TMDL specifies the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and allocates pollutant loadings among point and nonpoint pollutant sources. The TMDL for the Mad River watershed has been set at 120 percent of natural sediment loading. According to the report, the natural sediment loading in the basin is approximately 894 tons/square mile/year based on an annual average.

The WPAFB Storm Water Management Plan (SWMP) and the Storm Water Pollution Prevention Plan (SWPPP) (prepared to comply with the CWA and the Ohio Water Pollution Control Act) provides detailed descriptions of storm drainage areas and their associated outfalls, potential storm water pollution sources, and material management approaches to reduce potential storm water contamination (WPAFB 2011c). The SWPPP was last updated in September 2011 while the SWMP was last updated in April 2011. An OEPA industrial permit (National Pollutant Discharge Elimination System [NPDES] 1IO00001) and a municipal NPDES General permit (OHQ000002) cover the WPAFB storm water program (WPAFB 2011d).

The SWPPP and SWMP provide specific best management practices (BMPs) to prevent surface water contamination from activities such as construction, storing and transferring of fuels, storage of coal, use of deicing fluids, storage and use of lubrication oils and maintenance fluids, solid and hazardous waste management, and use of deicing chemicals. Some storm water also enters the Base from surrounding communities and areas (WPAFB 2001).

The Base's NPDES permit was last modified in January 2011 and expires in September 2014. There are 20 defined drainage or "Outfall Areas" on Base (WPAFB 2011d). There are 23 NPDES discharge monitoring points on Base that are addressed under the NPDES permit. Ultimately, all storm water from WPAFB flows into the Mad River. The NMUSAF and surrounding area are located with NPDES Area 1 (NA1), which drains north into the Mad River. **Figure 3-3** presents the location of the NMUSAF as it exists within NA1. In addition, there are no surface water bodies or drainages in the vicinity of the NMUSAF.

Floodplains

A large portion of WPAFB lies within the Mad River floodplain. The 10-year floodplain is at 804.7 ft above MSL, and the 100-year floodplain is at 813.4 ft above MSL (North American Vertical Datum [NAVD] 1988).

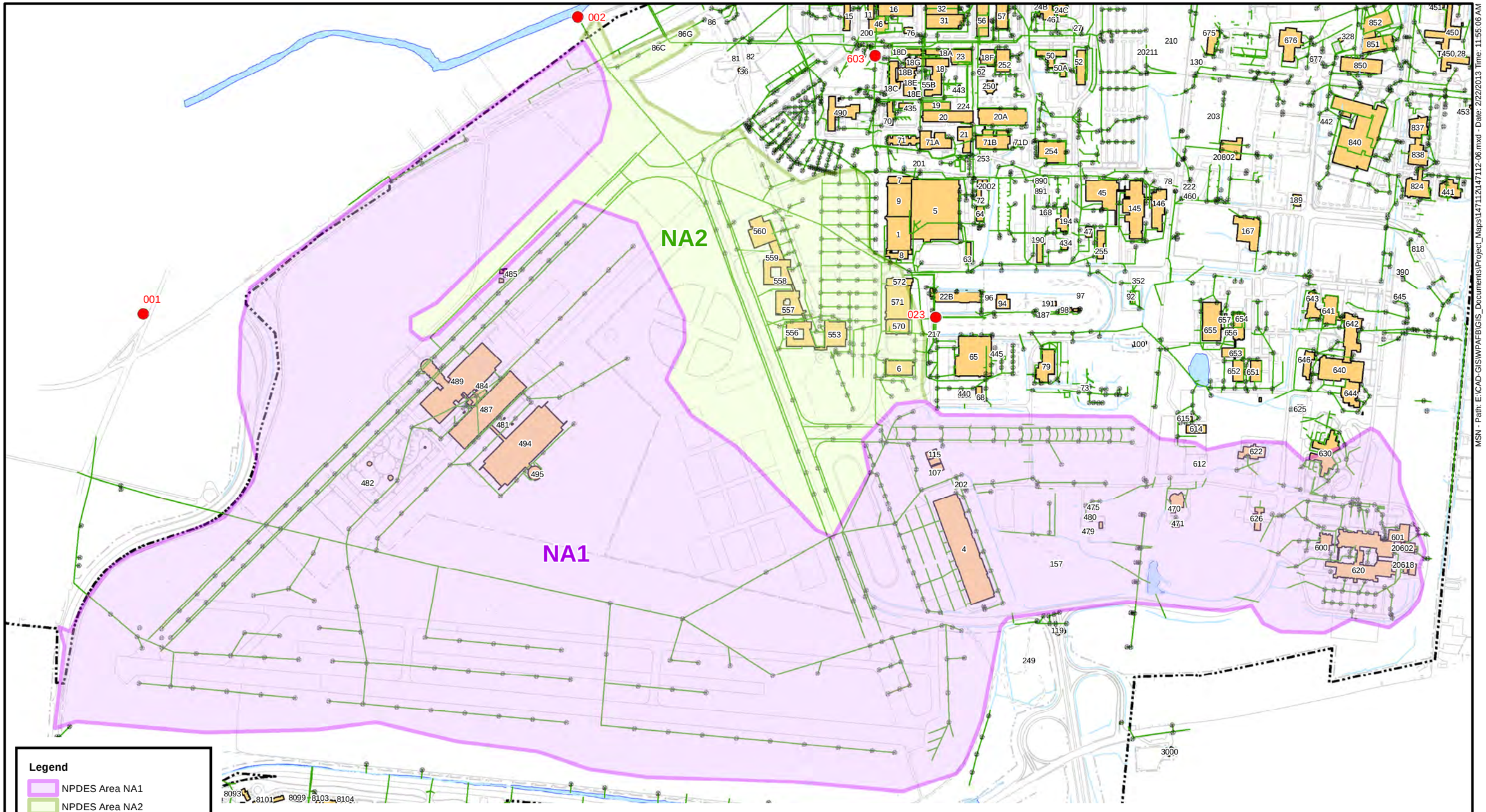
Based on a review of the FEMA Flood Insurance Rate Map (FIRM), the proposed site for Hangar 4 is not located in or adjacent to a floodplain (FEMA 2012). **Figure 3-4** presents the FEMA FIRM flood zone map for the proposed NMUSAF addition site.

3.6 Biological Resources

3.6.1 Definition of the Resource

Biological resources include native or naturalized plants and animals, and the habitats, such as wetlands, forests, and grasslands, in which they exist. Sensitive and protected biological resources include plant and animal species listed as threatened or endangered by the USFWS or a state.

Wetlands are an important natural system and habitat because of the diverse biologic and hydrologic functions they perform. These functions include water quality improvement, groundwater recharge and discharge, pollution mitigation, nutrient cycling, wildlife habitat detention, and erosion protection. Wetlands are protected as a subset of the "the waters of the United States" under Section 404 of the CWA. The term "waters of the United States" has a broad meaning under the CWA and besides navigable water, incorporates deepwater aquatic habitats and wetlands.



WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 3-3
NPDES Area NA1

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER	s-147112.0601-10/12-w
Cincinnati, OH	10/15/12	--	JIS	SB	CH		

WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 3-4
Proposed NMUSAF Addition
Flood Zone Map

The U.S. Army Corps of Engineers (USACE) defines wetlands as "those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR Part 328).

Under the Endangered Species Act (ESA) (16 U.S.C. 1536), an "endangered species" is defined as any species in danger of extinction throughout all or a large portion of its range. A "threatened species" is defined as any species likely to become an endangered species in the foreseeable future. The USFWS also maintains a list of species considered to be candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS has attempted to advise government agencies, industry, and the public that these species are at risk and might warrant protection under the Act.

The ODNR, Division of Wildlife may restrict the taking or possession of native wildlife threatened with statewide extirpation and maintains a list of endangered species (Ohio Revised Code 1531.25). Additionally, ODNR maintains a list of plant species native to the state and in danger of extirpation or are threatened with becoming endangered. These plants are protected pursuant to Ohio Revised Code Chapter 1518.

3.6.2 Existing Conditions

Vegetation

The Base contains four general types of natural vegetative communities including forest, old fields, prairie, and wetlands. Areas that may be impacted by the Proposed Action are primarily disturbed areas. These include maintained areas that are frequently mowed such as right-of-ways, lawns, and recreational areas, and have been designated by the Base as turf and landscaped areas.

The Base has been awarded the Arbor Day Foundation's Tree City USA designation for fourteen years (WPAFB 2012a). The Tree City USA award originates from the National Arbor Day Foundation, an organization founded in 1976 dedicated to tree plantings, conservation, and promotion of community forestry. Benefits of being a Tree City designee include creating a framework for action, education, a positive public image, and citizen pride.

Wildlife

The Base is home to a variety of wildlife. Previously conducted surveys documented the presence of 23 mammals, 118 birds, 8 reptiles, and 6 amphibians on the Base (3D 1998, BHE 2005). The majority of the project area is located within disturbed areas on the Base and those species occurring in such areas are common species to the Base and surrounding area.

Because birds as well as mammals pose a hazard to airfield and aircraft operations, the Air Force has established bird air strike hazard and wildlife management plans. The Base implements a comprehensive Bird/Wildlife Aircraft Strike Hazard (BASH) plan that involves prevention, monitoring, and reduction of bird/wildlife hazards (WPAFB 2011b).

Threatened and Endangered Species

Endangered and threatened species on the Base are protected under the ESA. In addition, AFPD 32-70 and AFI 32-7064 require all Air Force installations to protect species classified as federally or state endangered or threatened. The Endangered Species Management Plan (BHE 2001), which has been incorporated into the Integrated Natural Resources Management Plan (INRMP) (WPAFB 2011b), provides species-specific protection and conservation measures to protect known special status species occurring on the Base. Protected wildlife species known to occur or known to have occurred on WPAFB include:

Federally-Listed

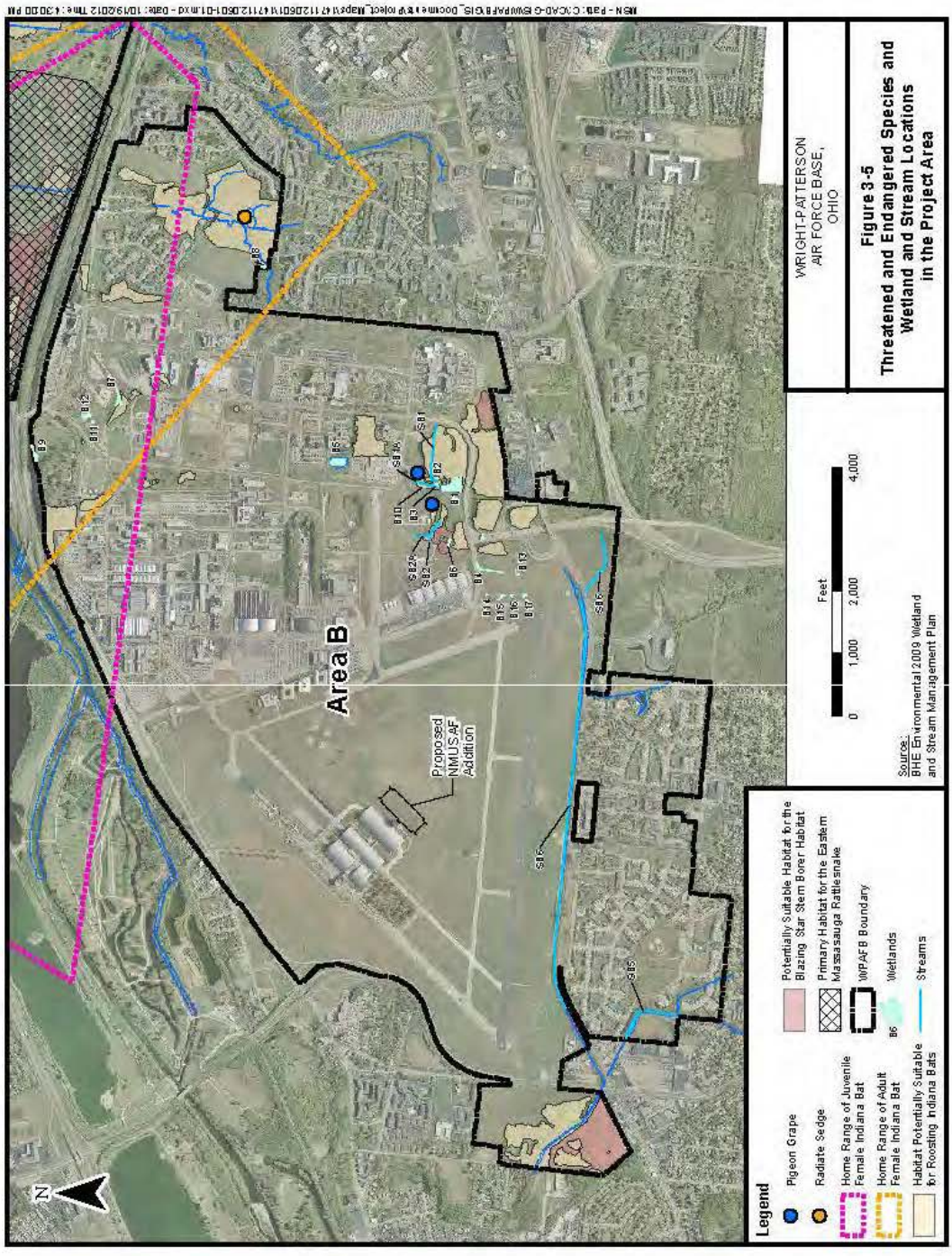
- Indiana bat (*Myotis sodalis*), endangered
- Eastern massasauga rattlesnake (*Sistrurus c. catenatus*), candidate species
- Clubshell (*Pleurobema clava*), endangered

State-Listed

- King rail (*Rallus elegans*), endangered
- Common tern (*Sterna hirundo*), endangered
- Bald eagle (*Haliaeetus leucocephalus*), threatened
- Osprey (*Pandion haliaetus*), endangered
- Sharp-shinned hawk (*Accipiter striatus*), special interest
- Peregrine falcon (*Falco peregrines anatum*), endangered
- Upland Sandpiper (*Bartramia longicauda*), threatened
- Sedge Wren (*Cistothorus platensis*), species of concern
- Henslow's sparrow (*Ammodramus henslowii*), special interest
- Blazing star stem borer or Beer's Noctuid (*Papaipema beeriana*), endangered
- Sunflower moth (*Tarachidia binocular*)
- Butternut *Juglans cinerea*), potentially threatened
- Whorled water-milfoil (*Myriophyllum verticillatum*), endangered
- Great plains ladies' tresses (*Spiranthes magnicamporum*), potentially threatened
- Pigeon grape (*Vitis cinerea*), potentially threatened

Locations of threatened and/or endangered species known to occur at WPAFB in the vicinity of the proposed addition are presented on **Figure 3-5**.

The federal candidate species, eastern massasauga rattlesnake is usually found in wet areas including wet prairies, marches, and low-lying areas adjacent to higher ground for foraging. Neither the historic nor current population size nor status of massasauga snakes at WPAFB has been determined. Reports of massasauga sightings have been limited to the Prime Base Engineer Emergency Force Training Area and


Area B
Proposed NMUSAF Addition
N
Legend
Pigeon Grape
Radiate Sedge
Home Range of Juvenile Female Indiana Bat
Home Range of Adult Female Indiana Bat
Habitat Potentially Suitable for Roosting Indiana Bats
Potentially Suitable Habitat for the Blazing Star Stem Borer Habitat
Primary Habitat for the Eastern Massasauga Rattlesnake
WPAFB Boundary
Wetlands
Streams
Feet
0
1,000
2,000
4,000
Source:
BHE Environmental 2009 Wetland and Stream Management Plan
WRIGHT-PATTERSON AIR FORCE BASE, OHIO
Figure 3-5
Threatened and Endangered Species and Wetland and Stream Locations in the Project Area

Twin Base Golf Course in Area A. There is no requirement to survey the proposed project area for potential habitat because the eastern massasauga is a Federal candidate species.

As part of this EA, consultation with the ODNR was conducted to request Ohio Natural Heritage Program information for state- and federally-listed threatened and endangered plants and animals in the vicinity of the project area. In addition, the ODNR conducted a search of known capture sites and hibernacula for the Indiana bat within a ten-mile radius of the proposed construction site. According to a response from the ODNR, a Bald eagle nest exists approximately 1-mile northwest of the proposed construction site and an Indiana bat capture record was identified within a five-mile radius of the proposed construction site (ODNR does not provide specific locations of this sensitive species). A copy of the ODNR letter and maps identifying the location of the Bald eagle nest is included in **Appendix B**.

The USFWS was also contacted as part of this EA to request known presence or absence of Federal- and state-listed species that may be located within the project vicinity. The USFWS responded in a letter dated November 6, 2012 indicating there are no Federal wilderness areas, wildlife refuges or designated critical habitat within the vicinity of the project area. The USFWS recommended that proposed activities minimize water quality impacts, including fill in streams and wetlands and best management practices should be utilized to minimize erosion and sedimentation. A copy of the letter is provided in **Appendix B**.

The clubshell is a federally listed endangered freshwater mussel occurring in 12 streams in Kentucky, Pennsylvania, Indiana, Ohio, Michigan, and West Virginia. Past surveys conducted by 3D/International, Inc. (1998) and BHE Environmental (1999) documented clubshell subfossil remains at the confluence of Trout Creek and the Mad River and near the confluence of Mud Run and the Mad River (WPAFB 2011b). No sightings of the clubshell have been reported within the project area.

The snuffbox (*Epioblasma triquetra*) occurs in swift current of riffles and shoals over gravel and sand with occasional cobble and boulders. The snuffbox is known to be present in the Stillwater and Little Miami River and drainages where preferred habitat exists. No sightings of the snuffbox have been reported within the project area.

The rayed bean (*Villosa fabalis*) is generally known to exist in small headwater creeks, but records exist indicating this species has been sited in larger rivers. The rayed bean is usually found in or near shoal or riffle areas, and in the shallow, wave-washed areas of lakes. Substrates typically include gravel and sand, and the rayed bean is often associated with, and buried under the roots of vegetation, including water willow and water milfoil. The rayed bean is known to exist in perennial streams in Greene and Montgomery Counties where preferred habitat exists. No sightings of the rayed bean have been reported within the project area.

Wetlands/Jurisdictional Waters

Executive Order 11990, *Protection of Wetlands*, May 24, 1977, directs Federal agencies to consider alternatives to avoid adverse effects on and incompatible development in wetlands. Federal agencies are directed to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland.

The CWA sets the basic structure for regulating discharges of pollutants to U.S. waters. Section 404 of the CWA establishes a Federal program to regulate the discharge of dredge and fill material into waters of the United States, including wetlands. The National Wetlands Inventory (NWI), a department within USWFS; USEPA; and the NRCS help in identifying wetlands.

Eighteen wetlands and 13 streams are located in Area B at WPAFB (BHE 2010). Of these, none are located in close proximity to the proposed project site. The nearest wetlands (B14, B15) and streams (SB6) are located at distances greater than 1,000 feet to the proposed project site. **Figure 3-5** presents the location of wetlands and streams in Area B.

3.7 Cultural Resources

3.7.1 Definition of the Resource

As defined by 36 CFR 800.16, historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to a Native American tribe or Native Hawaiian organization and that meet the NRHP criteria. Several Federal laws and regulations govern protection of cultural resources, including the National Historic Preservation Act (NHPA) (1966), the Archaeological and Historic Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (1990).

Native American tribes define cultural resources very broadly as the resources necessary for the survival and maintenance of their way of life. Ethnographic resources include plants and animals, ceremonial sites, tribal historic sites, and areas of sacred geography possessing mythic/spiritual significance.

Typically, cultural resources are subdivided into archeological resources (prehistoric or historic sites where human activity has left physical evidence of that activity but no structures remain standing) or architectural resources (buildings or other structures or groups of structures, or designed landscapes that are of historic or aesthetic significance). Archaeological resources comprise areas where human activity has measurable altered the earth or deposits of physical remains are found (e.g., arrowheads and bottles).

Architectural resources include standing buildings, bridges, dams, and other structures of historic or aesthetic significance. Generally, architectural resources must be more than 50 years old to be considered for the NRHP. More recent structures might warrant protection if they have potential as Cold War-era resources. Structures less than 50 years in age, and particularly DoD structures in the category of Cold War-era, are evaluated under explicit guidance of the National Park Service Bulletin 22.

The Base is obliged to consider the effects of construction for the proposed addition on any historic properties. In doing so, WPAFB must first define the Area of Potential Effects (APE). According to 36 CFR § 800.16(d), the APE is defined as:

> *The geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking.*

In accordance with Section 106 of the NHPA, determinations regarding the potential effects of an undertaking on historic properties are presented to the SHPO.

3.7.2 Existing Conditions

The Base, in consultation with the SHPO, has determined that the APE for the proposed project consists of property in the vicinity of the existing NMUSAF site. The Base also owns over 250 historic buildings, several that are individually eligible for inclusion on the NRHP and most of which are located in one of three NFHP-eligible historic districts. The Integrated Cultural Resources Management Plan (ICRMP) for WPAFB, prepared in concurrence with the SHPO, indicates the following NMUSAF Facilities are listed in or eligible for the NRHP and/or are listed on the WPAFB historic building list (WPAFB 2006).

Eligible for the NRHP

- 20487 (Hangar 2)
- 20489 (Hangar 1)
- 20001 (Presidential Aircraft Hangar)
- 20009 (Presidential Aircraft Hangar)
- 20004 (Storage)
- 20006 (Storage)

Historic Buildings

- 20487 (Built 1988)
- 20489 (Built 1971)
- 20001 (Built 1943)
- 20009 (Built 1943)

- 20004 (Built 1944)
- 20005 (Built 1943)
- 20006 (Built 1943)

In addition to the individual eligible for the NRHP and historic listings, the NMUSAF exists within the Wright Field Historic District Boundary, a WPAFB historic landscape. The Wright Field Historic District contains numerous significant sites, structures, and objects. The Base also considers Facility 20494, which has not been formally assessed for its historic significance, to be potentially eligible for listing on the NRHP for Cold War significance.

The SHPO has been contacted regarding the undertaking's effects on historic properties. A letter from WPAFB requesting concurrence with the no adverse effect determination and the SHPO's response of concurrence is included in **Appendix B**.

3.8 Socioeconomics

3.8.1 Definition of the Resource

Socioeconomics are defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Regional birth and death rates and immigration and emigration affect population levels. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these two fundamental socioeconomic indicators might be accompanied by changes in other components, such as housing availability and the provision of public services. Socioeconomic data at county, state, and national levels permit characterization of baseline conditions in the context of regional, state, and national trends.

Data in three areas provide key insights into socioeconomic conditions that might be affected by a proposed action. Data on employment could identify gross numbers of employees, employment by industry or trade, and unemployment trends. Data on personal income in a region could be used to compare the "before" and "after" effects of any jobs created or lost as a result of a proposed action. Data on industrial or commercial growth or growth in other sectors provides baseline and trend line information about the economic health of a region. Because data projecting future social and economic conditions are not always available, it is appropriate to use planning documents to identify expected conditions that could experience impacts due to a given action.

In appropriate cases, data on an installation's expenditures in the regional economy help to identify the relative importance of an installation in terms of its purchasing power and jobs base. Demographics identify the population levels and changes to population levels of a region. Demographics data might also identify, as appropriate to evaluation of a proposed action, its characteristics in terms of race, ethnicity, poverty status, educational attainment level, and other broad indicators.

Socioeconomic data are presented at county, state, and U.S. levels to characterize baseline socioeconomic conditions in the context of regional, state, and national trends. Data have been collected from previously published documents issued by Federal, state, and local agencies and from state and national databases (e.g., U.S. Bureau of Economic Analysis' Regional Economic Information System).

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks,* requires Federal agencies, to the extent permitted by law and mission, to identify and assess environmental health and safety risks that might disproportionately affect children. The EO further requires Federal agencies to ensure that their policies, programs, activities, and standards address these disproportionate risks. The order defines environmental health and safety risks as "risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink and use for recreation, the soil we live on, and the products we use or are exposed to)." Such information aids in evaluating whether a proposed action would render vulnerable children targeted for protection in the EO.

3.8.2 Existing Conditions

Social and Economic Conditions

Population – The Base is the largest base in the Air Force with over 27,000 personnel serving in 116 different units. Military personnel at WPAFB serving in the Air Force, Air National Guard/Reserves, Navy, Army, and Coast Guard account for approximately 9,500 persons. Civilian personnel at WPAFB serving in roles such as contract civilians and private businesses account for approximately 17,900 persons (WPAFB 2010).

Metropolitan statistical areas are geographic entities defined by the Office of Management and Budget (OMB) for use by Federal statistical agencies in collecting, tabulating, and publishing Federal statistics. A metro area contains a core urban area of 50,000 or more population. Each metro area consists of one or more counties and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work) with the urban core (Census 2012).

The Base is located 10 miles outside of Dayton, Ohio. According to the 2010 Census data, the city of Riverside had a population of 25,201; the city of Dayton had a population of 141,527; and the Dayton Metropolitan Area (MA) (consisting of Greene, Miami, Montgomery, and Preble counties) had a population of 841,502 residents. Based on the 2010 Census data, the Dayton MA was the fourth largest metropolitan area in Ohio (Census 2010a).

Employment – The Base provides a major source of employment in the five-county area. In addition, WPAFB awards numerous contracts every year to local businesses. For fiscal year (FY) 10, the total number of jobs provided by WPAFB was 27,378 (WPAFB 2010). This number includes military active

duty, trainees and reservists, DoD civilians, and other civilians, such as contractors. This number of indirect jobs supported by the Base, such as restaurants, dry cleaners, and others is estimated at 31,972. The total economic impact to the local Dayton community was $4.5 billion.

Table 3-5 lists the industry of employment for residents around in the city of Riverside, the Dayton MA, Montgomery County, and the state of Ohio in 2010. A large portion of residents in the Dayton MA are employed in education, health and social services; a lower percentage of residents are employed in retail trade, finance, insurance, real estate, and rental and leasing.

The 2010 unemployment rate for the Dayton MA was 10.7 percent, almost double than the statewide average of 5.6 percent (BLS 2011, Census 2010a). The 2010 unemployment rate in the city of Riverside around WPAFB and within Montgomery County was 8.0 and 6.2 percent, respectively, which was slightly higher than the state average of 5.6 percent.

Residents living in Riverside have a lower per capita income and median household income in comparison to Montgomery County and the state of Ohio (Census 2010b). However, Riverside has a higher percent of persons living below the poverty level as compared to the state of Ohio (Census 2010c) (**Figure 3-6**).

Education – The Fairborn school district provides education services for school-age children of parents employed at WPAFB.

The percentage of Riverside residents who have obtained a high school diploma is slightly higher (37.8 percent) than the averages for Montgomery County (30.3 percent) and the state of Ohio (35.8 percent). The percentage of Riverside residents holding a bachelor's degree or higher is substantially lower on average than in the wider geographical regions of Montgomery County or the state of Ohio (**Figure 3-7**).

Community Resources and Services – The Base offers numerous community resources such as a bank, bakery-deli, flowers, ice cream, barber/beauty shop, laundry/dry cleaning facility, all of which are located within the commissary at the Kittyhawk Center. The USAF Medical Center at WPAFB services primary deployment platforms and contains a teaching hospital. In addition to these resources, recreational facilities such as the Aero Club, a bowling alley, an arts/crafts center, golf courses, recreational lakes, and sports/fitness complexes exist at WPAFB (WPAFB 2012b).

Table 3-5. Employment of Residents in Riverside, Dayton Metropolitan Area, Montgomery County, and the State of Ohio (2010)

Employment by Industry	City of Riverside (%)	Dayton MA* (%)	Montgomery County (%)	State of Ohio (%)
Employed Persons in Armed Forces	3.3	Category Not Reported	0.5	0.1
Industry of Civilian Labor Force				
Agriculture, forestry, fishing and hunting, and mining	0.0	Estimate Not Released	0.2	1.0
Construction	4.7	6.7	5.0	5.6
Manufacturing	14.5	4.3	13.9	16.0
Wholesale trade	3.1	Category Not Reported	2.8	3.0
Retail trade	13.9	2.3	11.4	11.7
Transportation and warehousing, and utilities	6.9	4.5	4.5	5.0
Information	1.7	4.7	2.6	2.0
Finance, insurance, real estate, and rental and leasing	4.3	2.2	5.3	6.6
Professional, scientific, management, administrative, and waste management services	9.0	7.6	10.3	8.9
Education, health and social services	16.3	17.7	24.5	23.4
Arts, entertainment, recreation, accommodation, and food services	12.3	7.6	9.5	8.5
Other services (except public administration)	4.7	Category Not Reported	4.5	4.5
Public administration	8.7	Category Not Reported	5.4	3.9
Unemployment Rate	8.0	10.7**	6.2	5.6

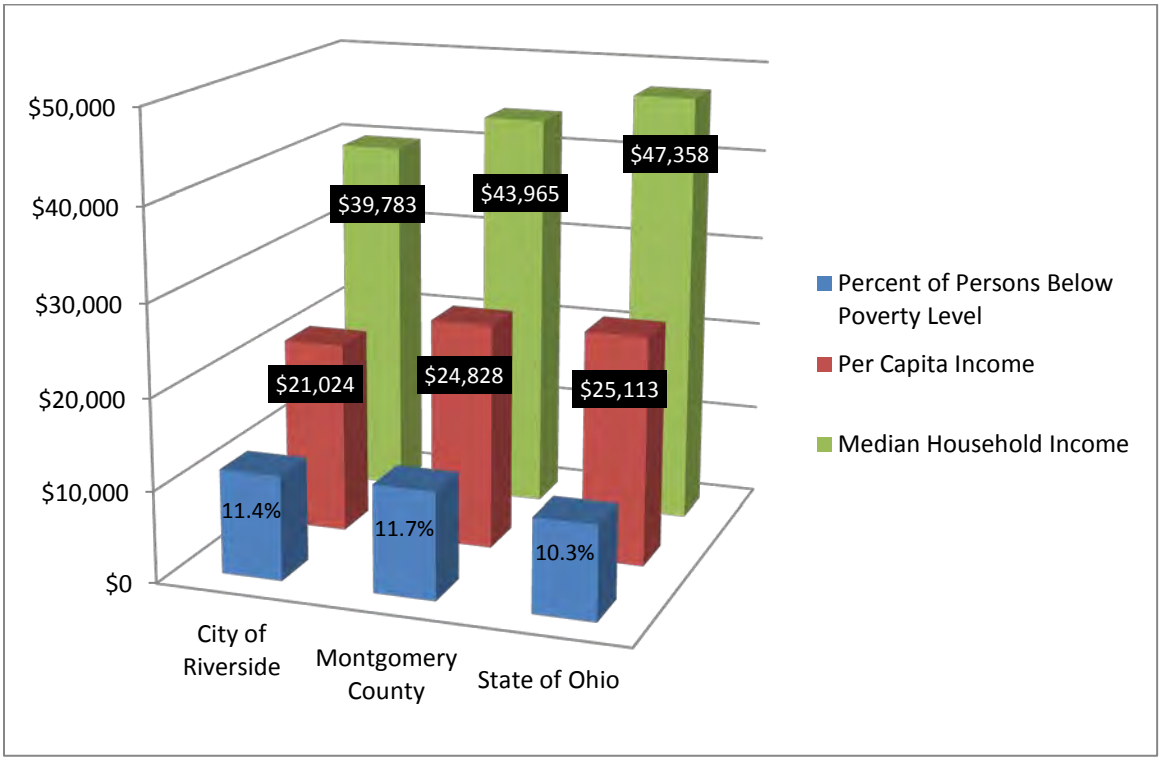
Source for City of Riverside, Montgomery County, and the State of Ohio: U.S. Census Bureau, 2010
Source for Dayton MA: Bureau of Labor Statistics, May 2011
*MA = Metropolitan Area; Dayton MA includes Greene, Miami, Montgomery, and Preble Counties
**Dayton MA Unemployment Rate for Aug 2012 reported at 7.3 percent; 2010 rate presented in Table 3-5 for comparison to area 2010 data

3.9 Environmental Justice

3.9.1 Definition of the Resource

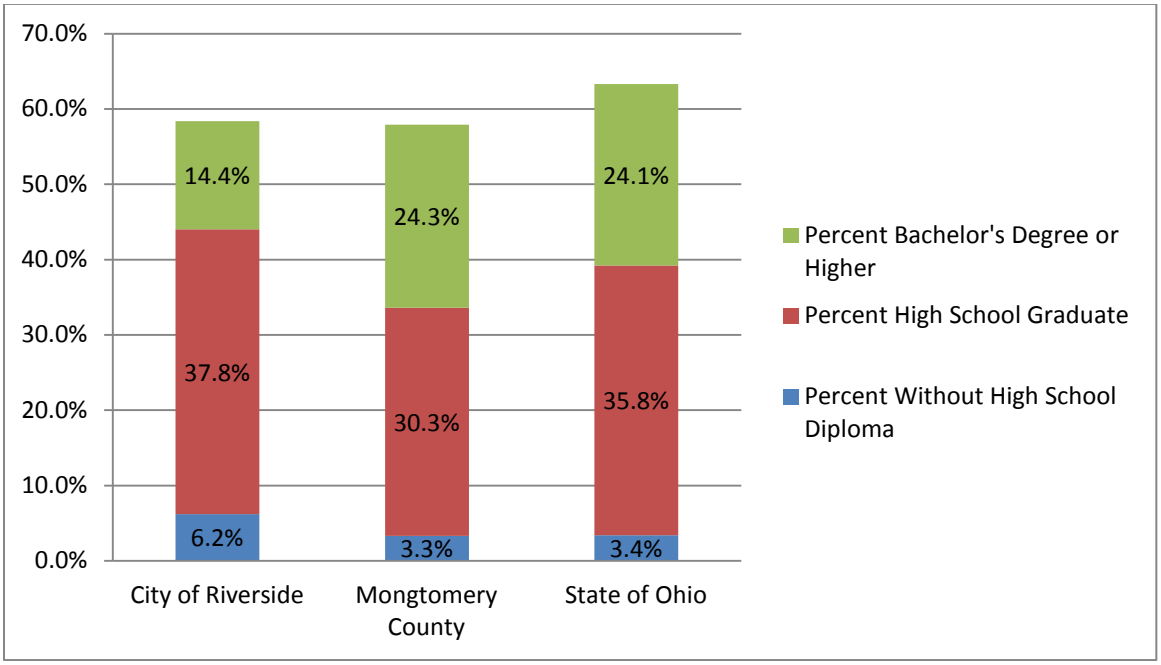
Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that all federal agencies address the effects of policies on minorities and low-income populations and communities, and to ensure that there would be no disproportionately high and adverse human health or environmental effects to minority or low-income populations or communities in the area. A "minority" is defined as a person who is Black, Hispanic (regardless of race), Asian American, American Indian, and/or Alaskan Native. "Low-income" is defined as a household income at or below the U.S. Census Bureau Poverty Threshold (CDC 2011).

Figure 3-6. Income and Poverty Level of Residents in Riverside, Montgomery County, and the State of Ohio



Source: Bureau of Census 2010b, 2010c

Figure 3-7. Educational Attainment of Residents in Riverside, Montgomery County, and the State of Ohio



Source: Bureau of Census 2010b, 2010c

A minority population is defined as any readily identifiable group of minority persons who live in geographic proximity, or are geographically dispersed or transient persons (such as migrant workers) who will be similarly affected by a proposed program, policy, or action (CDC 2011). Minority populations residing in the study area were compared to the population characteristics of the city and state. The CEQ guidance states that "minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis."

Low-income status was based upon comparing the income of the proposed project site and larger study area residential population to the U.S. Census Bureau Poverty Threshold. The CEQ guidelines do not specifically state the percentage considered meaningful in the case of low-income populations. The definition of "low income populations" is defined by HUD as populations where "50 percent or greater are low-income individuals".

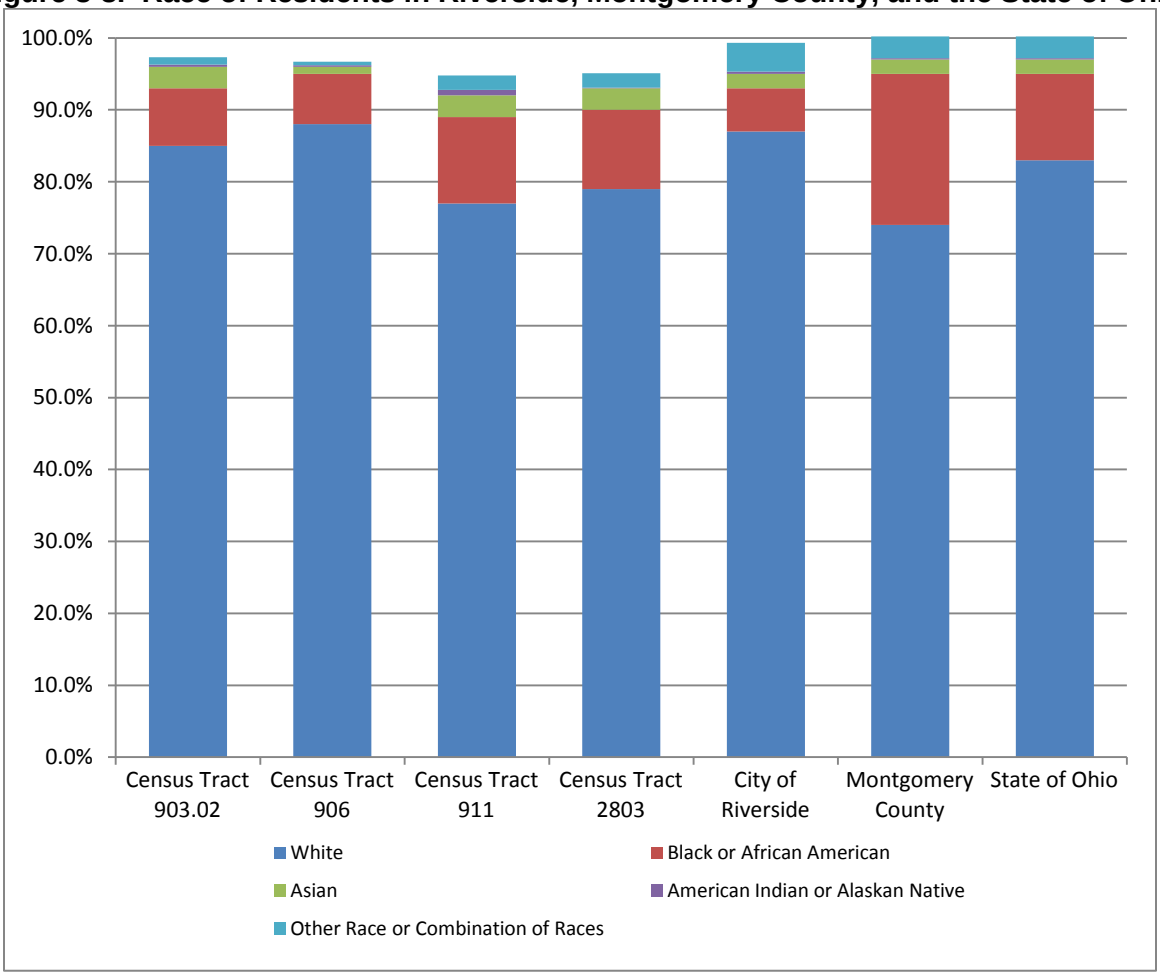
3.9.2 Existing Conditions

A screening analysis using U.S. Census Bureau racial and economic information catalogued by 2010 Demographic Profiles was used to identify low income and minority populations living in the vicinity of the project area and in the geographic region. Wright-Patterson Air Force Base and surrounding areas were included in Census Tracts 903.02, 906, 911, 9800 (Riverside and vicinity tracts included within Montgomery County) and 2803 (WPAFB tract included within Greene County). Montgomery County Tract 9800 includes the west portion of Area B of WPAFB; however, no data is reported for Tract 9800. Demographics for Tract 9800 are included within Tract 2803, which includes the entirety of WPAFB (Census 2010d).

The city of Riverside as a whole has a lower percentage of minorities than the larger geographic region of Montgomery County or the State of Ohio (**Figure 3-8**). Census Tracts 903.02, 906, and 911 represent populations in and around the Riverside area. Tract 903.02 (north-northwest of the NMUSAF), Tract 906 (west of the NMUSAF), and Tract 911 (south of the NMUSAF) have a higher percentage of females than Tract 2803 (Census 2010d).

Tracts 911 and 2803 have a higher percentage of minorities and a higher percentage of persons reporting as Hispanic or Latino than the average for the surrounding area. Tracts 903.02 and 911 have a higher percentage of children under the age of 18 than the average for the surrounding area. Tracts 911 and 2803 have a lower percentage of older adults (over 65 years) and a higher percentage of minorities than the average for the surrounding area (Census 2010d).

Figure 3-8. Race of Residents in Riverside, Montgomery County, and the State of Ohio



Source: Bureau of Census 2010b, 2010c, 2010d

3.10 Transportation and Infrastructure

3.10.1 Definition of the Resource

Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly human-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as "urban" or developed. The availability of infrastructure and its capacity to support growth are generally regarded as essential to economic growth of an area.

The infrastructure components to be discussed in this section include transportation systems, utilities (electrical power, natural gas, liquid fuel, and water supply), pollution prevention, solid waste, sanitary and wastewater systems, heating and cooling, communications, and airfield pavement.

Solid waste management primarily concerns itself with the availability of landfills to support a population's residential, commercial, and industrial needs. Alternative means of waste disposal might

involve waste-to-energy programs or incineration. In some localities, landfills are designed specifically for, and are limited to, disposal of construction and demolition debris. Recycling programs for various waste categories (e.g., glass, metals, and papers) reduce reliance on landfills for disposal.

3.10.2 Existing Conditions

The infrastructure information contained in this section was obtained from the WPAFB General Plan (WPAFB 2001) and provides a brief overview of each infrastructure component and comments on its existing general condition.

Transportation System. State highways provide direct access to WPAFB. State Route 844 provides a route from Gate 15A to Interstate 675 (I-675), which is located east of the Base. Interstate 675 provides direct access to I-70, which is approximately 9 miles to the north; U.S. 35, which is approximately 5 miles to the south; and I-75, which is approximately 15 miles to the southwest (WPAFB 2001). State Route 235 provides access from Gate 26A to SR-4 and I-70 (WPAFB 2001). Traffic enters Area B through Gates 1B from Springfield Street, 19B from National Road, and 22B off of I-675.

Electrical Power. Dayton Power & Light provides WPAFB with electrical power (WPAFB 2001). The Base receives power via two substations, which is delivered by over 500 miles of primary electrical lines on Base. These aboveground and underground transmission lines are owned by WPAFB (WPAFB 2001). The electrical distribution system on Base is designed to meet the needs of a much larger base population so the demands of service are within the system's capacity (WPAFB 2001). The overall condition of the system is adequate in providing the power to the current Base population.

Natural Gas. The natural gas at WPAFB is supplied by Vectren. The on-Base natural gas system, which is owned by WPAFB, contains over 130,000 linear ft of underground piping and 11 distribution subsystems (WPAFB 2001). Vectren owns a distribution line that goes past the Wright Memorial area. The natural gas system is the principal heating option for housing areas and outlying areas of the Base. It feeds some individual buildings and the three satellite heating plants: Facilities 20581, 10849, and 34019 (WPAFB 2001).

Liquid Fuel. The liquid fuel system at WPAFB is delivered primarily by tank trucks with an alternate capability for pipeline delivery. Defense Logistics Agency-Energy is responsible for determining mode of delivery. The Base operates approximately 85 underground storage tanks (USTs) and 175 aboveground storage tanks (ASTs).

Eighty percent of the storage capacity on Base is for Jet Fuel-8 (JP-8), which is supplied directly to the Base via tank truck from Defense Fuel Support Point – Lebanon. The Bulk Fuels Storage tank farm is comprised of ten 420,000-gallon JP-8 ASTs and one 840,000-gallon JP-8 AST, one 15,000-gallon motor gas AST, and one 220,000-gallon diesel AST. The tank farm is located near Facility 30154 on Patterson

Field and is located within the north end of the southern transitional area. No tank farms are located near the NMUSAF.

Water Supply. The water supply and distribution system at WPAFB consists of two Base-owned and operated water collection, treatment, storage, and distribution systems (WPAFB 2001). One system services Wright Field (Area B) and The Woods (formerly referred to as Woodland Hills). The second system services Area A and Patterson Field. The only portion of the Base that does not use the WPAFB water distribution system is the Page Manor housing area. Page Manor receives water from the Montgomery County Sanitary Sewer District (WPAFB 2001). WPAFB utilizes approximately 3.2 million gallons of drinking water per day. An 8-inch water line supplies water from Area B at WPAFB to the NMUSAF.

Pollution Prevention. Air Force Instruction 32-7080, *Pollution Prevention Program*, implements the regulatory mandates in the Emergency Planning and Community Right-to-Know Act, Pollution Prevention Act of 1990; EO 12856, *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements*; EO 12873, *Federal Acquisition, Recycling, and Waste Prevention*; and EO 12902, *Energy Efficiency and Water Conservation at Federal Facilities*. Air Force Instruction 32-7080 prescribes the establishment of Pollution Prevention Management Plans. The 88 ABW fulfills this requirement with the following plans (WPAFB 2001):

- Integrated Solid Waste Management Plan
- Storm Water Pollution Prevention Plan
- Hazardous Waste Management Plan
- Hazardous Material Emergency Planning and Response Plan
- The Spill Prevention Control and Countermeasure Plan

These plans ensure that WPAFB maintains a waste reduction program and meets the requirements of the CWA; NPDES permit program; and Federal, state, and local requirements for spill prevention control and countermeasures.

Construction under the Proposed Action would involve required anti-terrorism/force protection measures and conform to applicable State of Ohio and WPAFB building codes and regulations. Because the Proposed Action would involve the alteration of federal buildings, modifications and renovations would comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* and implement other "high performance sustainable principles" as applicable under EO 13514(2)(g).

Solid Waste. Municipal solid waste at WPAFB is managed in accordance with the guidelines specified in AFI 32-7042, *Solid and Hazardous Waste Compliance*. This AFI incorporates by reference the requirements of Subtitle D, 40 CFR 240 through 244, 257, and 258, and other applicable Federal regulations, AFIs, and DoD Directives. In general, AFI 32-7042 establishes the requirement for

installations to have a solid waste management program that incorporates the following: a solid waste management plan; procedures for handling, storage, collection, and disposal of solid waste; recordkeeping and reporting; and pollution prevention.

The Base operates a Qualified Recycling Program that is run by 88 ABW/Asset Management Division of the Environmental Branch (CEANP). The recycling center is located in Facility 10293 on Patterson Field. The recycling program includes aluminum, glass, paper, plastics, oil, and ferrous and nonferrous materials (WPAFB 2001).

The Base has a contract for solid waste pick-up and disposal of all refuse on the base (WPAFB 2001). The contractor removes refuse from military family housing and industrial areas on the Base.

***Sanitary Sewer and Wastewater Systems*.** The sanitary sewer collection system at WPAFB is owned by the Base and consists of 43 miles of pipelines. The wastewater produced on the north side of Patterson Field is discharged to the Fairborn treatment plant, northwest of the Base. The wastewater produced on the remainder of Patterson Field, Wright Field, and Page Manor is served by the City of Dayton treatment system.

The Base produces an average of 3.5 million gallons per day (gpd) of sewage. The overall condition of the system is adequate in the collection of wastewater. The current system is designed to accommodate a Base population that is approximately 50 percent larger (WPAFB 2001).

***Heating and Cooling*.** The Base is heated with six coal- and gas-fired central heating plants. These plants are located throughout the Base and provide approximately 80 percent of the annual heating requirements for WPAFB (WPAFB 2001). The two largest central heating plants are in Facility 31240, which serves Patterson Field and Kittyhawk Community Center; and Facility 20770, which serves Wright Field (WPAFB 2001). There are also four satellite heating plants that serve smaller areas on the Base. These plants operate on natural gas and provide 4 percent of the Base's overall heating needs. The remaining 16 percent of the Base's overall heating is met by natural gas furnaces in individual buildings (WPAFB 2001).

***Communications*.** The communications system at WPAFB provides support to the 445 AW and its associate units. The communications system consists of telephone, local computer systems, long-haul communications, and land mobile radio systems (WPAFB 2001). There are over 100 miles of communication cable ducts on Base (WPAFB 2001).

The Base's communications and information utility infrastructure is in good condition (WPAFB 2001). There are improvements planned for the Base that would enable it to meet any known future communication requirements (WPAFB 2001).

3.11 Health and Safety

3.11.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. The public has little access to the construction activities associated with the Proposed Action.

Safety and accident hazards can often be identified and reduced or eliminated. Necessary elements for an accident-prone situation or environment include the presence of the hazard itself together with the exposed (and possibly susceptible) population. The degree of exposure depends primarily on the proximity of the hazard to the population. Activities that can be hazardous include transportation, maintenance and repair activities, and the creation of highly noisy environs. The proper operation, maintenance, and repair of vehicles and equipment carry important safety implications. Any facility or human-use area with potential explosive or other rapid oxidation processes creates unsafe environments for nearby populations. Extremely noisy environments can also mask verbal or mechanical warning signals such as sirens, bells, or horns.

Munitions and Explosive Safety

Explosives are classified based on their reactions to specific influences. The explosives hazard class is further subdivided into "division", based on the character and predominance of the associated hazards and their potential for causing personnel casualties or property damage. Explosives Hazard Class/Division 1.4 designates a moderate fire with no significant blast or fragment hazard (Sandia 2010).

Explosive safety zones (ESZs) are required for areas where ordinance are stored or handled. ESZs are typically determined based upon the net explosive weight of the ordinance to be stored or handled and the blast resistance properties of the magazine. Explosive Safety Quantity Distance (ESQD) arcs that delineate the extents of each ESZ are constructed. The ESZ and ESQD requirements are specified in AFMAN 91-201, *Explosive Safety Standards*.

Construction Safety

Construction site safety is largely adherence to regulatory requirements imposed for the benefit of employees and implementation of operational practices that reduce risks of illness, injury, death, and property damage. The health and safety of onsite military and civilian workers are safeguarded by DoD and USAF regulations designed to comply with standards issued by Occupational Safety and Health Administration (OSHA) and USEPA. These standards specify the amount and type of training required

for industrial workers, the use of protective equipment and clothing, engineering controls, and maximum exposure limits for workplace stressors.

3.11.2 Existing Conditions

Fire Hazards and Public Safety

The Fire Department at WPAFB provides fire, crash, rescue, and structural fire protection at the Base. A WPAFB fire station located in Facility 20626 serves all of the Museum's buildings. The NMUSAF abides by a general safety policy relating to the performance of all activities at the Base. Individuals, supervisors, managers, and commanders are expected to give full support to safety efforts and safety awareness and strict compliance with established safety standards are expected.

Munitions and Explosives Safety

The NMUSAF is located within Wright Field, which historically had an active airfield and supported flying operations. The airfield is now closed; however, a limited number of aircraft landings are conducted on the runway in the airfield in support of the Museum. Due to the research and development nature of the area and lack of a fully operational airfield, there are few ESQD clear zones that constrain development in the Wright Field area. A 69-ft QD clear zone is required around Facility 20100 (approximately 5,000 ft northeast of the NMUSAF) for aircraft survivability range storage and a clear zone is required in the vicinity of Facility 20094 (approximately 4,000 ft northeast of the NMUSAF) for a firing range with a shot aim area surrounded by a hill. The unit uses bullet catches to ensure that shots are contained in the area (**Figure 3-9**).

In addition, QD clear zones are required for two events that are held annually at WPAFB: the Air Force Materiel Command's (AFMC) Freedom Call Tattoo event and the Air Force Marathon. The AFMC Freedom Call Tattoo is held each summer to recognize the contributions of military veterans, their families, and all Americans who support them and includes a spectacular presentation of flyovers, music, narration, and fireworks (WPAFB 2012c). The main fireworks firing area for the Tattoo event is located approximately 1,000 ft southeast of the proposed Hangar 4 site and contains a QD clear zone of 250 ft (**Figure 3-9**).

The Air Force Marathon is conducted annually on the third Saturday of September in celebration of the U.S. Air Force. The marathon course is a 26.2-mile run that traverses historical places throughout the Base and commences approximately 2,000 ft northeast of the proposed Hangar 4 site (WPAFB 2012d). To begin the race, a racegun is fired signaling the start of the race. Two 200-ft QD clear zones are required around each of the marathon racegun detonation points (**Figure 3-9**).

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	11/2/12	--	MSN	SAB	WHS	147112-01

R200'

2009 AF Marathon
Detonation Point

R200'

2008 AF Marathon
Detonation Point

Proposed
NMUSAF
Addition

300'

Main Fireworks Area

R250'

AFMC-WPAFB-07 S002

R750'

Forward Firing
Location

R250'

Forward Firing
Location

SPECTATOR AREA

Snow Fence

(shot aim)

N

SCALE: 1"=600'

0 200 400 600 1,200

**WRIGHT-PATTERSON
AIR FORCE BASE,
OHIO**

**Figure 3-9
Explosive Safety Quantity Distance
in the Area of the NMUSAF**

M. Najar - E:\CAD-GIS\AcadGIS 2012\147112\147112-01.dwg - Friday, 2/22/13 - 11:16 AM

Construction and Demolition Safety

All contractors performing construction activities are responsible for following ground safety regulations and worker compensation programs, and are required to conduct construction activities in a manner that does not pose any risk to workers or personnel. Industrial hygiene programs address exposure to hazardous materials, use of personal protective equipment, and availability of Material Safety Data Sheets. Industrial hygiene is the responsibility of contractors, as applicable. Contractor responsibilities are to review potentially hazardous workplace operations; to monitor exposure to workplace chemical (e.g., asbestos, lead, hazardous materials), physical (e.g., noise propagation), and biological (e.g., infectious waste) agents; to recommend and evaluate controls (e.g., ventilation, respirators) to ensure personnel are properly protected or unexposed; and to ensure a medical surveillance program is in place to perform occupational health physicals for those workers subject to any accidental chemical exposures.

Anti-Terrorism/Force Protection

The DoD seeks effective ways to minimize the likelihood of mass casualties from terrorist attacks against DoD personnel in the buildings in which they work and live. The intent of the United Facilities Criteria (UFC) 4-010-01 standard is to minimize the possibility of mass casualties in buildings or portions of buildings owned, leased, privatized, or otherwise occupied, managed, or controlled by or for DoD. The UFC standards provide appropriate, implementable, and enforceable measures to establish a level of protection against terrorist attacks for all inhabited DoD buildings where no known threat of terrorist activity currently exists.

The UFC mandates minimum standoff distances for new and existing buildings and for those buildings to exist within or outside of a controlled perimeter. Standoff distances are distances maintained between a building or portion thereof and the potential location for an explosive detonation, primarily an adjacent roadway, parking area, and/or trash cans. A controlled perimeter is a physical boundary at which vehicle access is controlled with sufficient means to channel vehicles to the access control points. At a minimum, access control at a controlled perimeter requires the demonstrated capability to search for and detect explosives. The proposed construction site of Hangar 4 would not be within a controlled perimeter as the proposed site is not located within the secure portion of Area B at WPAFB. Hangar 4 would be evaluated with respect to minimum standoff distances for buildings outside of a controlled perimeter as part of the design phase of the project.

3.12 Hazardous Materials and Wastes and Environmental Restoration Program Sites

3.12.1 Definition of the Resource

The AFPD 32-70, *Environmental Quality*, establishes the policy that the USAF is committed to

- Cleaning up environmental damage resulting from its past activities
- Meeting all environmental standards applicable to its present operations
- Planning its future activities to minimize environmental impacts
- Managing responsibly the irreplaceable natural and cultural resources it holds in public trust

- Eliminating pollution from its activities wherever possible

Hazardous material is defined as any substance with physical properties of ignitability, corrosivity, reactivity, or toxicity that might cause an increase in mortality, serious irreversible illness, and incapacitating reversible illness, or that might pose a substantial threat to human health or the environment. Hazardous waste is defined as any solid, liquid, contained gaseous, or semi-solid waste; or any combination of wastes that pose a substantial present or potential hazard to human health or the environment.

Evaluation of hazardous materials and wastes focuses on USTs and ASTs and the storage, transport, and use of pesticides and herbicides, fuels, and petroleum, oils, and lubricants (POL). Evaluation might also extend to generation, storage, transportation, and disposal of hazardous wastes when such activity occurs at or near the project site of a proposed action. In addition to being a threat to humans, the improper release of hazardous materials and wastes can threaten the health and well-being of wildlife species, botanical habitats, soil systems, and water resources. In the event of release of hazardous materials or wastes, the extent of contamination varies based on type of soil, topography, and water resources.

Special hazards are those substances that might pose a risk to human health, but are not regulated as contaminants under the hazardous waste statutes. Included in this category are asbestos-containing materials (ACM), radon, lead-based paint (LBP), polychlorinated biphenyls (PCBs), and unexploded ordnance. The presence of special hazards or controls over them might affect, or be affected by, a proposed action. Information on special hazards describing their locations, quantities, and condition assists in determining the significance of a proposed action.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and the Toxic Substances Control Act (TSCA), defines hazardous materials. The Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA), which was further amended by the Hazardous and Solid Waste Amendments, defines hazardous wastes. In general, both hazardous materials and wastes include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, might present substantial danger to public health or welfare or the environment when released or otherwise improperly managed.

Through its Environmental Restoration Program (ERP), the DoD evaluates and cleans up sites where hazardous wastes have been spilled or released to the environment. The ERP provides a uniform, thorough methodology to evaluate past disposal sites, to control the migration of contaminants, to minimize potential hazards to human health and the environment, and to clean up contamination. Knowledge of past ERP activities provides a useful gauge of the condition of soils, water resources, and other resources that might be affected by contaminants. It also aids in identification of properties and

their usefulness for given purposes (e.g., activities dependent on groundwater usage might be foreclosed where a groundwater contaminant plume remains to complete remediation).

3.12.2 Existing Conditions

Hazardous Materials

Air Force Instruction 32-7086, *Hazardous Materials Management,* establishes procedures and standards that govern management of hazardous materials throughout the USAF. It applies to all USAF personnel who authorize, procure, issue, use, or dispose of hazardous materials, and to those who manage, monitor, or track any of those activities. A privately contracted hazardous material pharmacy (HAZMART) is located in Facility 30089. The HAZMART ensures that only the smallest quantities of hazardous materials necessary to accomplish the mission are purchased and used (WPAFB 2001).

Hazardous and toxic material procurements at WPAFB are approved and tracked by the Bio-environmental Engineering Flight. The Asset Management Division supports and monitors environmental permits, hazardous material and hazardous waste storage, spill prevention and response, and participation on the Base Environmental Protection Committee. The Hazardous Substance Steering Committee is a network safety, environmental and logistics experts who work with hazardous material Issue Point Managers, Unit Environmental Coordinators (UECs), and other hazardous material users to ensure safe and compliant hazardous material management throughout the base (WPAFB 2008a).

Approximately 95 percent of NMUSAF restoration is conducted utilizing water-based paints; however, a small amount of solvent-based paints are also utilized for aircraft and artifact restoration. In addition, epoxy paints, solvent-based adhesives, and aerosols are utilized during restoration (WPAFB 2012e).

Hazardous Waste

The 88 ABW maintains a Hazardous Waste Management Plan (WPAFB 2008b) as directed by AFI 32-7042, *Solid and Hazardous Waste Compliance*. This plan prescribes the roles and responsibilities of all members of WPAFB with respect to the waste stream inventory, waste analysis plan, hazardous waste management procedures, training, emergency response, and pollution prevention. The plan establishes the procedures to comply with applicable Federal, state, and local standards for solid waste and hazardous waste management.

Wastes generated at WPAFB include waste flammable solvents, contaminated fuels and lubricants, paint/coating, stripping chemicals, waste oils, waste paint-related materials, mixed-solid waste (MSW), and other miscellaneous wastes. Management of hazardous waste is the responsibility of each waste-generating organization and the Asset Management Division (88 ABW/CEA). The Base produces more than 1,000 kilograms of hazardous waste per month and is considered a large quantity hazardous waste generator.

There are two hazardous waste accumulation permitted sites associated with NMUSAF restoration activities. One site is for the temporary storage of waste paint related material and one site is for bead blasting material, which contains cadmium, lead paint chips, and chromium (WPAFB 2012e).

Stored Fuels

Stored fuels present a potential threat to the environment, which is mitigated at WPAFB through spill prevention and control and countermeasures (SPCC). The WPAFB SPCC Plan (WPAFB 2008c) describes practices used to minimize the potential for stored fuel spills, prevent spilled materials from migrating off the base, and ensure that the cause of any spill is corrected. The WPAFB Oil and Hazardous Substance Integrated Contingency Plan (WPAFB 2005) describes emergency planning, notification and spill response practices. Collectively, the SPCC Plan, with a focus on spill prevention, and the Integrated Contingency Plan (ICP), with a focus on spill response, provides a comprehensive strategy for preventing stored fuel releases to the environment.

The Spill Prevention Coordinator (SPC) is the primary point of contact for the SPCC Program. The SPC works closely with Tank Managers, UECs, and WPAFB emergency response personnel to implement the SPCC Plan. Required SPCC training, standard operating procedures (SOPs), inspections, and record keeping are coordinated by the SPC.

Asbestos-Containing Materials

Air Force Instruction 32-1052, *Facilities Asbestos Management,* provides the direction for asbestos management at USAF installations. This instruction incorporates by reference applicable requirements of 29 CFR 669 et seq. 29 CFR 1910.1025, 29 CFR 1926.58, 40 CFR 61.3.80, Section 112 of the CAA, and other applicable AFIs and DoD Directives.

Air Force Instruction 32-1052 requires bases to develop an Asbestos Management Plan to maintain a permanent record of the status and condition of ACM in installation facilities, as well as documenting asbestos-management efforts. In addition, the instruction requires installations to develop an asbestos operating plan detailing how the installation accomplishes asbestos-related projects. Asbestos is regulated by the USEPA with the authority promulgated under OSHA, 29 U.S.C. 669, et seq. Section 112 of the CAA regulates emissions of asbestos fibers to ambient air. USEPA policy is to leave asbestos in place if disturbance or removal could pose a health threat.

The 88 ABW/CEA has developed standard contract specifications for the removal and disposal of ACM. These specifications incorporate all applicable USEPA, OSHA, and USDOT requirements. The Ohio Department of Health (ODH) must license contractors, and all asbestos-abatement work must be done under the onsite supervision of an ODH-designated "competent person." Work area monitoring for airborne asbestos fibers is accomplished by an industrial hygienist certified by the American Board of

Industrial Hygiene. Industrial hygienists must also be certified by the ODH. Laboratory analyses of air samples and of bulk samples must be accomplished in a certified and accredited laboratory.

Non-friable Category I ACM can be disposed of in a sanitary landfill. Friable Category I and all Category II ACM must be disposed of in an EPA-approved landfill. ACM-abatement contractors are responsible for obtaining all required permits from regulatory agencies and for OEPA and ODH notification requirements (WPAFB 2001). The Base has implemented an Asbestos Management Plan to minimize risk from friable ACM in buildings where the material remains. Additional sampling is usually required in buildings scheduled for renovation or demolition (WPAFB 2001).

There is the potential that ACM was used in the construction of the older sections of the NMUSAF, more specifically, Hangar 1 (constructed in 1971) and Hangar 2 (constructed in 1988); however, these areas of the Museum are not part of the proposed project. Because ACM is no longer used at WPAFB, there will be no ACM involved in the construction of proposed Hangar 4.

Lead-Based Paint

The Residential Lead-Based Paint Hazard Reduction Act of 1992, Subtitle B, Section 408 (commonly called Title X), passed by Congress on October 28, 1992, regulates the use and disposal of LBP on Federal facilities. Federal agencies are required to comply with applicable Federal, state, and local laws relating to LBP activities and hazards.

The USAF policy and guidance establishes LBP management at USAF facilities. The policy incorporates, by reference, the requirements of 29 CFR 1910.120, 29 CFR 1926, 40 CFR 50.12, 40 CFR 240 through 280, the CAA, and other applicable Federal regulations. Additionally, the policy requires each installation to develop and implement a facility management plan for identifying, evaluating, managing, and abating LBP hazards.

More than 95 percent of WPAFB facilities were constructed prior to 1980 and contain LBP. Lead concentrations are generally low with the exception of paints used on outdoor structures such as water towers. The HUD action level is 5,000 ppm. However, even when concentrations are below this, OSHA Lead Construction Standard (29 CFR 1926.62) must be followed. All workers performing lead abatement or removal or any other lead disturbance are required to have a lead workers license issued by the ODH. Licensing is not required if the contract involves mechanical demolition. Contractors containerize LBP wastes which are disposed of under contract. Bioenvironmental Engineering samples and monitors all in-house projects involving LBP (WPAFB 2001).

There is the potential that LBP was used in the construction of the older sections of the NMUSAF. The main area of the present NMUSAF opened in 1971; however, this area of the NMUSAF is not part of the

proposed project. Because LBP is no longer used at WPAFB, there will be no LBP involved in the construction of Hangar 4.

Environmental Restoration Program

The ERP is a subcomponent of the Defense Environmental Restoration Program that became law under SARA (formerly the Installation Restoration Program [IRP]). The ERP requires each DoD installation to identify, investigate, and clean up hazardous waste disposal or release sites. The Base began its IRP in 1981 with the investigation of possible locations of hazardous waste contamination. In 1988, WPAFB entered into an Ohio Consent Order with the OEPA. In October 1989, WPAFB was placed on the USEPA's National Priorities List, a list of sites that are considered to be of special interest and require immediate attention (WPAFB 2001).

The Base currently has identified 67 ERP sites, two regional groundwater sites, and several areas of concern per the Air Force Restoration Information Management System. The Base has grouped the majority of confirmed or suspected sites requiring investigation and characterization in 11 geographically-based operable units (OUs), designated as OUs 1 through 11 (IT 1999). In addition to the 11 OUs, WPAFB addressed base-wide issues of groundwater and surface water contamination under the Basewide Monitoring Program (BMP) and Long-Term Groundwater Monitoring (LTM) Program. Principal groundwater contaminants beneath WPAFB include benzene, toluene, ethylbenzene, xylene, trichloroethene, and tetrachloroethene (WPAFB 2007).

As shown on **Figure 3-2**, the NMUSAF is located between OU6 (west of the NMUSAF), OU8 (east of the NMUSAF), and OU9 (southeast of the NMUSAF). The closest ERP sites to the NMUSAF include: Burial Site 5 (BS5) (approximately 1,800 ft southwest of proposed addition), Earthfill Disposal Zone 1 (EFDZ1) (approximately 2,400 ft northwest of proposed addition), and sites within OU8 and OU9 (greater than 3,000 ft east-southwest of proposed addition). Spill Site 7 (3,300 ft east of proposed addition and referred to as Tank Farm F) and Spill Site 9 (3,600 ft east of proposed addition and referred to as Tank Farm B) were closed under the Bureau of Underground Storage Tank Regulations, and therefore, did not require additional investigation and characterization.

A Record of Decision (ROD) was approved for the ERP site soils associated with groundwater located upgradient of Facility 20490 (WPAFB 1998). Per the ROD, the approved remedial alternative for soils at these sites was No Action.

4.0 ENVIRONMENTAL CONSEQUENCES

This section presents an evaluation of the environmental impacts that might result from implementing the Proposed Action or the No Action Alternative. The section also includes an analysis of the potential cumulative impacts on WPAFB; unavoidable adverse impacts; the relationship between short-term use of the human environment and the maintenance and enhancement of long-term productivity; and irreversible and irretrievable commitments of resources.

The specific criteria for evaluating impacts and assumptions for the analyses are presented under each resource area. Evaluation criteria for most potential impacts were obtained from standard criteria; Federal, state, or local agency guidelines and requirement; and/or legislative criteria. Proposed mitigation measures are included for each environmental issue, as appropriate, to reduce potential impacts.

Impacts may be direct or indirect and are described in terms or type, context, duration, and intensity, which is consistent with the CEQ regulations. "Direct effects" are caused by an action and occur at the same time and place as the action. "Indirect effects" are caused by the action and occur later in time or are farther removed from the place of impact, but are reasonably foreseeable.

Impacts are defined in general terms and are qualified as adverse or beneficial, and as short-term or long-term. For the purposes of this EA, short-term impacts are generally considered those impacts that would have temporary effects. For example, air quality impacts from construction debris associated with pavement crushing and replacement would be considered short-term as they would only last for the duration of the construction activities. Long-term impacts are generally considered those impacts that would result in permanent effects. For example, the loss of vegetation associated with eradication of vegetation would be considered long-term.

The thresholds of change for the intensity of impacts are defined as follows:

- *Negligible*, the impact is localized and not measureable or at the lowest level of detection;
- *Minor*, the impact is localized and slight but detectable;
- *Moderate*, the impact is readily apparent and appreciable; or
- *Major*, the impact is severely adverse or highly noticeable and considered to be significant.

4.1 Land Use

4.1.1 Evaluation Criteria

Potential impacts on land use are based on the level of land use sensitivity in areas affected by a proposed action and compatibility of proposed actions with existing conditions. In general, a land use impact would be adverse if it met the following criteria:

- Inconsistency or noncompliance with existing land use plans or policies
- Precluded the viability of existing land use

- Precluded continued use or occupation of an area
- Incompatibility with adjacent land use to the extent that public health or safety is threatened
- Conflict with planning criteria established to ensure the safety and protection of human life and property

4.1.2 Proposed Action

There would be no adverse effects on land use because no changes to land use would occur at or surrounding WPAFB. Land access rights would result in restriction of land-based emanation of natural or man-made obstructions and/or activities that may intrude or compromise navigational airspace clear zones; however, no changes in land use would occur as a result of the Proposed Action.

The Proposed Action would not conflict with any applicable off-Base land use ordinances or designated CZs and would therefore have no impact on land use.

4.1.3 No Action

The No Action alternative would have no impact on land use over current conditions.

4.2 Air Quality

4.2.1 Evaluation Criteria

The environmental consequences to local and regional air quality conditions near a proposed Federal action are determined based upon the increases in regulated pollutant emissions relative to existing conditions and ambient air quality. For the purposes of this EA, the impact in NAAQS "attainment" areas would be considered significant if the net increases in pollutant emissions from the Federal action would result in any one of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Expose sensitive receptors to substantially increased pollutant concentrations
- Exceed any Evaluation Criteria established by a SIP

As mentioned in Section 3.2, the area including WPAFB is classified as a moderate maintenance area for O_3, designated as moderate nonattainment for $PM_{2.5}$, and is designated as an unclassified/attainment area for all other criteria pollutants.

Impacts on air quality in NAAQS "nonattainment" areas are considered significant if the net changes in project-related pollutant emissions result in any of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Increase the frequency or severity of a violation of any ambient air quality standard
- Delay the attainment of any standard or other milestone contained in the SIP

Because WPAFB is located in an area designated as maintenance for O_3 and non-attainment for $PM_{2.5}$, a conformity applicability analysis is required to determine whether the Proposed Action is subject to the Conformity Rule. With respect to the General Conformity Rule, effects on air quality would be

considered significant and, therefore, subject to an evaluation to determine compliance with the General Conformity Rule, if:

- The proposed Federal action does not relate to transportation plans, programs, and projects developed, funded, or approved under Title 23 U.S.C. or the Federal Transit Act, and
- The Proposed Action-related direct and indirect emissions exceed *de minimis* threshold levels established in 40 CFR 93.153(b) for individual nonattainment pollutants or for pollutants for which the area has been re-designated as a maintenance area.

The *de minimis* threshold emission rates were established by the USEPA in the General Conformity Rule to focus analysis requirements on those Federal actions with the potential to have "significant" air quality impacts. **Table 4-1** presents these thresholds, by regulated pollutant. These *de minimis* thresholds are similar, in most cases, to the definitions for major stationary sources of criteria and precursors to criteria pollutants under the CAA's NSR Program (CAA Title I). As shown in **Table 4-1**, *de minimis* thresholds vary depending on the severity of the nonattainment area classification.

Table 4-1. Conformity *de minimis* Emission Thresholds

Pollutant	Status	Classification	*de minimis* Limit (tpy)
Ozone (measured as NO_x or VOCs)	Nonattainment	Extreme	10
		Severe	25
		Serious	50
		Moderate/marginal (inside ozone transport region)	50 (VOCs)/100 (NO_x)
		All others	100
	Maintenance	Inside ozone transport region	50 (VOCs)/100 (NO_x)
		Outside ozone transport region	100
Carbon Monoxide (CO)	Nonattainment/ maintenance	All	100
Particulate Matter (PM_{10})	Nonattainment/ maintenance	Serious	70
		Moderate	100
		Not applicable	100
Particulate Matter ($PM_{2.5}$)	Nonattainment/ maintenance	Direct Emissions	100
		SO_2 precursors	100
		NO_x precursors	100
Sulfur Dioxide (SO_2)	Nonattainment/ maintenance	Not applicable	100
Nitrogen Oxides (NO_x)	Nonattainment/ maintenance	Not applicable	100

Source: 40 CFR 93.153 (b)
tpy: tons per year

In addition to the *de minimis* emission thresholds, Federal PSD regulations define air pollutant emissions to be significant if the source is within 10 kilometers of any Federal Class I area (e.g., wilderness area

greater than 5,000 acres or national park greater than 6,000 acres) and emissions would cause an increase in the concentration of any regulated pollutant in the Class I area of 1 $\mu g/m^3$ or more [40 CFR 52.21(b)(23)(iii)]. Although PSD rules apply only to stationary sources of emissions, for the purposes of this EA, such an impact to a Class I area would be considered adverse.

4.2.2 Proposed Action

Air Quality Regulations Applicable to the Proposed Action

Stationary Sources and New Source Review. Local and regional pollutant impacts resulting from direct and indirect emissions from stationary emission sources under the Proposed Action are addressed through Federal and state permitting program requirements under NSR regulations (40 CFR 51 and 52). Local stationary source permits are issued and enforced by RAPCA. As noted previously, WPAFB has appropriate permits in place and has met all applicable permitting requirements and conditions for existing stationary devices. No new or modified stationary sources are anticipated as part of the Proposed Action.

National Emissions Standards for Hazardous Air Pollutants. Because WPAFB has the potential to emit more than 25 tpy of hazardous air pollutants, certain hazardous air pollutant-emitting activities on Base are subject to regulation under National Emissions Standards for Hazardous Air Pollutants (NESHAP), are promulgated in 40 CFR Parts 61 and 63. These NESHAP require emissions control measures and detailed recordkeeping to show compliance with NESHAP restrictions on the types of materials, such as paints, adhesives, and solvents, which can be used in specific operations. Specific NESHAP to which activities at WPAFB are subject include:

- 40 CFR 63 Subpart GG, Aerospace NESHAP
- 40 CFR 63 Subpart ZZZZ, Reciprocating Internal Combustion Engines (RICE) Maximum Achievable Control Technology (MACT)
- 40 CFR 63 Subpart DDDDD, Industrial, Commercial, and Institutional Boilers (Boiler MACT)
- 40 CFR 61 Subpart M, Asbestos Remediation

In addition, WPAFB would also be subject to the Defense Land Systems and Miscellaneous Equipment (DLSME) NESHAP when that rule is promulgated. This rule would cover military surface coating operations other than those subject to the Aerospace and Shipbuilding NESHAP. The intent is to simplify compliance for DoD facilities that are currently forced to comply with multiple overlapping, and sometimes conflicting, NESHAP, including the Miscellaneous Metal Parts and Products Coating NESHAP, Plastic Parts and Products Coating NESHAP, Metal Furniture Coating NESHAP, Large Appliance Coating NESHAP, and Fabric and Other Textiles Coating NESHAP. The USEPA currently has no date set for publication of a draft DLSME NESHAP. No new stationary sources or modifications to existing stationary sources are anticipated as part of the Proposed Action and thus will not trigger additional NESHAP requirements.

Fugitive Dust Regulations. The OAC rule 3745-15-07 declares dust escaped from any source that causes damage to property to be a public nuisance. Pursuant to OAC rule 3745-17-08(A)(2), the OEPA Director may require any source that causes or contributes to such a nuisance to submit and implement a control plan that employs reasonably available control measures to prevent fugitive dust from becoming airborne. Because the Proposed Action includes construction activities that have the potential to generate noticeable amounts of dust particles larger in size than PM_{10}, control practices should proactively be employed by the general contractor to minimize the impact to the neighboring community and museum patron vehicles. The control practices can include, but are not limited to:

- Maintain a written Dust Control Plan onsite
- Apply water or other dust control chemicals to roads and surfaces as applicable
- Cover open bodied trucks during the transport of material
- Promptly remove debris from paved surfaces to minimize and prevent re-suspension
- Plan material and equipment delivery routes to minimize contact of dust with museum patrons

Architectural and Industrial Maintenance Coating Regulations. The OAC rule 3745-113, Architectural and Industrial Maintenance (AIM) Coatings, applies to any person who supplies, sells, offers for sale, or manufactures any AIM coating for use within the state of Ohio, as well as any person who applies or solicits the application of any AIM coating within the state of Ohio. At a minimum, the coating specifications for the Proposed Action must conform to the VOC content standards identified in the OAC rule 3745-113-03 for each specific AIM coating type anticipated for application. The localized environmental impacts of the coating applications may be reduced by specifying the use of no-VOC or low-VOC content coatings and/or increasing the amount of pre-finished structural components used for construction.

Conformity. Because both a maintenance area and a nonattainment area are affected by this Proposed Action, the USAF must comply with the Federal General Conformity Rule. To do so, an analysis has been completed to ensure that, given the changes in direct and indirect emissions of the O_3 precursors (NO_x and VOCs), direct $PM_{2.5}$, and $PM_{2.5}$ precursors (SO_2 and NO_x), the Proposed Action would be in conformity with CAA requirements. The Conformity Determination requirements specified in this rule can be avoided if the project nonattainment pollutant rate increase resulting from the Proposed Action is below *de minimis* threshold levels for each nonattainment pollutant. For purposes of determining conformity in these nonattainment areas, projected regulated pollutant emissions associated with the Proposed Action were estimated using approved USEPA on-road vehicle emission models and available emission information. The emissions calculations and *de minimis* threshold comparisons are presented in the Air Conformity Analysis provided in **Appendix C**.

Based on a review of the proposed NMUSAF construction and operational activities at WPAFB, it has been determined that the potential sources of $PM_{2.5}$, SO_2, NO_x and VOC pollutant emissions associated

with the Proposed Action would be from (1) construction activities, (2) surface coating, (3) vehicular traffic emissions from commuter motor vehicles and truck material deliveries, and 4) recurring museum operations. Under the Proposed Action, worst case emissions were developed using very conservative construction activity estimates derived from design/build pre-bid documents, and staffing requirements anticipated annually for full implementation of the NMUSAF expansion. These emissions calculations assume that all construction would be completed within one year, and operations would commence the next year and each year following. The scope of the analysis was limited to those operations or activities that result in emissions that would be directly or indirectly attributable to the implementation of the Proposed Action.

Proposed Action Direct and Indirect Emissions

Construction Activities. The Proposed Action consists of three main structures proposed for construction including Hangar 4, a connector to the existing Hangar 3, and two concrete reinforced tow lanes. Additionally, a temporary construction material laydown and staging area would be constructed of gravel adjacent to the construction site. This temporary laydown area will be fully restored to its former state at the end of the project.

Construction activities would result in emissions of criteria pollutants from the equipment engine exhaust and particulate matter is emitted as fugitive duct from excavating activities and the movement of material and equipment. These emissions would be of a temporary nature. For purposes of analysis, combustion emissions were estimated using data from the *Air Emissions Factor Guide to Mobile Air Force Sources* dated December 2009. Fugitive dust emissions were estimated using USEPA's AP-42 Section 13.2.3 dated January 1995. The construction emissions are presented in **Table 4-2** and the calculations in **Appendix C**.

Surface Coating. Emissions from surface coating activities include surface painting of structural components and interior walls and partitions; and water-proof sealing of all concrete surfaces. Because Ohio regulations OAC Rule 3745-113 for AIM Coatings places maximum VOC content limitations on most types of coatings, emission calculations were based on the maximum allowable VOC content for each type of coating and estimated surface areas for steel structures, wall partitions, logos, and concrete surfaces.

The Proposed Action does not require any changes to the existing restoration surface coating activities of aircraft and artifacts. Therefore, the surface coating activities considered in this analysis are for all structural components to be painted black or dark gray and the concrete surfaces to be sealed. Based on construction estimates and worst case VOC content values, approximately 128,000 gallons of paint and sealant may be needed to complete the museum addition. These emissions are considered temporary and are presented in **Table 4-2** and the calculations in **Appendix C**.

Table 4-2. Criteria Pollutant Emissions at WPAFB Associated with the Proposed Action

Air Pollutant Emissions Source	VOC Emissions (tpy)	NO_x Emissions (tpy)	$PM_{2.5}$ Emissions (tpy)	SO_2 Emissions (tpy)
Construction Activities				
Equipment Exhaust	2.48	33.29	1.94	2.40
Fugitive Surface Dust	0.00	0.00	13.46	0.00
Subtotal Construction Emissions	**2.48**	**33.29**	**15.40**	**2.40**
Surface Coating				
Structures and Logos	77.49	0.00	0.00	0.00
Concrete Sealers	6.25	0.00	0.00	0.00
Subtotal Surface Coating Emissions	**83.74**	**0.00**	**0.00**	**0.00**
Vehicular Traffic				
Construction Commuting	0.08	0.38	0.009	0.006
Construction Deliveries	0.02	0.23	0.012	0.0004
Fugitive Roadway Dust	0.00	0.00	4.34	0.00
Subtotal Vehicular Traffic Emissions	**0.10**	**0.61**	**4.36**	**0.01**
Total Temporary Emissions Year 1	**86.32**	**33.91**	**19.76**	**2.41**
Recurring Museum Operations				
AF Personnel/Volunteer Commuting	0.03	0.14	0.004	0.002
AF Commuting Fugitive Roadway Dust	0.00	0.00	0.84	0.00
(Less) Shuttle Bus Service	0.003	0.05	0.003	0.00005
(Less) Shuttle Bus Roadway Fugitive Dust	0.00	0.00	0.07	0.00
Total Recurring Net Emissions Year 2 +	**0.03**	**0.09**	**0.77**	**0.002**

Tpy = tons per year

Vehicular Traffic. Calculations of air pollutant emissions from privately owned vehicles (POVs) used by construction workers for commuting and heavy duty delivery trucks for material and equipment movements were based on the projected vehicle miles traveled, vehicle category or classification (e.g., light-duty gasoline vehicle), and USEPA-approved pollutant emission factors. Emissions factors from USEPA's mobile source emission model, MOVES2010b, for Montgomery County Ohio were used to estimate emissions from motor vehicles.

In addition to motor vehicle emissions, roadway fugitive dust emissions were estimated using USEPA's AP-42 Section 13.2.1 dated November 2006 for both POV and delivery trucks. The vehicle traffic emissions are presented in **Table 4-2** and the calculations in **Appendix C**.

Recurring Museum Operations. By 2017, the NMUSAF staff and volunteers associated with the Proposed Action is projected to increase by no more than 4 and 150, respectively. These estimates would result in a corresponding increase in motor vehicle commuting emissions in the Dayton Metropolitan area. Calculations of air pollutant emissions from POVs used by Museum staff and volunteers for commuting were based on the vehicle miles traveled, vehicle category or classification (e.g., light-duty

gasoline vehicle), and USEPA-approved pollutant emission factors. Emissions factors from USEPA's mobile source emission model, MOVES2010b, were used to estimate emissions from motor vehicles.

With relocation of the Presidential Collection from a secured part of the base to new addition, the existing shuttle bus service that currently makes four trips per operating day will be eliminated. Calculation of the decrease in air emissions from the shuttle bus were based on the vehicle miles traveled, transit bus vehicle classification, and USEPA-approved pollutant emission factors derived from MOVES2010b. Also, roadway fugitive dust emissions were estimated using USEPA's AP-42 Section 13.2 dated November 2006 for both POV and the shuttle bus (decrease). The vehicle emissions are presented in **Table 4-2** and the calculations in **Appendix C**.

Analysis. The information presented in **Table 4-2** shows that NO_x, VOC, SO_2, and $PM_{2.5}$ emissions are projected to increase temporarily in the first year for construction and only slightly for recurring emissions beginning in year two under the Proposed Action at WPAFB. Comparing **Table 4-2** to the limits in **Table 4-1**, the Proposed Action would not result in a net emission increase above conformity *de minimis* limits listed in 40 CFR 93.153 (b). Because the emissions expected from the Proposed Action would not exceed *de minimis* levels, the General Conformity Rule does not apply and can be deemed to be in conformity with the Ohio SIP. **Appendix C** details the emissions factors, calculations, and estimates for construction, surface coating, vehicular traffic, and recurring operations emissions for the Proposed Action.

According to 40 CFR 81 Subpart D, no Class I visibility areas are located within 10 kilometers of WPAFB. The closest Federal Class I area is Mammoth Cave National Park in Kentucky, 320 kilometers to the south. Therefore, air emissions from the Proposed Action would not affect any Class I area.

The Proposed Action is projected to result in net emissions increases for all pollutants. The maximum Proposed Action-related net emissions increases are below all General Conformity *de minimis* thresholds. As a result of the Proposed Action, there would be minimal impacts on air quality over current conditions. The result is contingent upon the accuracy of assumptions made in deriving the emission calculations. The assumptions made for the VOC emissions associated with surface coating activities were based on estimates that approximately 128,000 gallons of paint and sealant combined may be needed to complete the museum addition. If the actual construction plan were to require more coating material than this, then mitigation steps would be required to reduce the VOC content of the coatings, order more prefinished structural components, and/or extend the construction schedule for surface coating activities to beyond the first twelve months of construction. Otherwise, a General Conformity Analysis may be required.

4.2.3 No Action

The No Action alternative would have no adverse impact on air quality because there would be no increase in emissions.

4.3 Noise

4.3.1 Evaluation Criteria

Noise impact analyses typically evaluate potential changes to existing noise environments that would result from implementation of a proposed action. Potential changes in the noise environment can be beneficial (i.e., if they reduce the number of sensitive receptors exposed to unacceptable noise levels), negligible (i.e., if the total area exposed to unacceptable noise levels is essentially unchanged), or adverse (i.e., if they result in increased noise exposure to unacceptable noise levels). Projected noise impacts were evaluated quantitatively for the Proposed Action and No Action Alternative for the conditions expected when runway replacement is complete.

4.3.2 Proposed Action

Implementation of the Proposed Action would have minor, temporary effects on the noise environment near the construction site resulting from the use of concrete crushing equipment and trucks. Nearby facilities and residences would experience muffled construction noise during the workday. However, noise generation would last only for the duration of construction activities, and could be reduced through restriction of activities to normal working hours (between 7:00 a.m. and 5:00 p.m.).

Because the noise environment on Base and in the vicinity of WPAFB is dominated by military aircraft overflights, additional noise produced by construction activities in the area of the NMUSAF would not affect sensitive receptors on or off the Base. Noise associated with construction equipment would be comparatively minor. The NMUSAF is located in the 65 to 70 dB noise zones (WPAFB 1995a).

Impacts on ambient noise levels from the construction area would result from activities involving heavy equipment such as bulldozers, concrete trucks, and paving machinery. Noise levels associated with common construction equipment are trucks, 83-93 dB at 50 ft; and jackhammer, 130 dB (Center 2012).

An unusual property of noise is that the sound pressure levels of two separate sounds are not directly additive. For example, two sounds of 70 dB each occurring in the same location results in a cumulative noise level of 73 dB, not a doubling to 140 dB. In addition, if two sounds are of different levels, the lower level adds less to the cumulative total as the difference increases. For example, if a 60 dB noise source were used in conjunction with a 70 dB noise source, a cumulative noise level of 70.5 dB would result. When two noise sources have greater than 10 dB difference, the lower noise source adds almost nothing to the higher noise level.

Workers and visitors at the NMUSAF would likely be affected by noise from construction activities. Based on the estimated noise measurements for equipment discussed in this section and the sound level increases described in Section 3.3, persons at a distance of approximately 50 ft from the work area could experience sound levels greater than 25 dB over the background level used in land use compatibility planning and environmental assessments (i.e., 65 dB). The nearest buildings to the proposed construction

site would be those associated with the NMUSAF and include Hangars 1, 2, and 3. However, the next closest on-Base building (Facility 20004) and off-Base residential dwellings and/or commercial buildings located in the city of Riverside, are well over 800 ft from the proposed construction area. Thus, there would be minor short-term adverse impacts from noise in the construction work area for workers and visitors in the vicinity of the NMUSAF. These short-term impacts from construction noise would be intermittent. No long-term adverse impacts would result from the proposed project.

Workers involved in the construction of the addition could experience short-term adverse effects during work in the construction area. Noise levels would be expected to be more intense in the immediate construction work area; however, effects would be minimized because workers would be responsible for adhering to health and safety regulations.

4.3.3 No Action

The No Action alternative would have no adverse impact on noise quality.

4.4 Geology and Soils

4.4.1 Evaluation Criteria

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential impacts of a proposed action on geological resources. Generally, impacts can be avoided or minimized if proper construction techniques, erosion control measures, and structural engineering design are incorporated into project development.

Analysis of potential impacts on geological resources typically includes the following steps:

- Identification and description of resources that could potentially be affected
- Examination of a proposed action and the potential impacts this action may have on the resource
- Assessment of the level of potential impacts
- Provision of mitigation measures in the event that potentially adverse impacts are identified

Effects on geology and soils would be adverse if they would alter the lithology, stratigraphy, and geological structure that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or change the soil composition, structure or function within the environment.

4.4.2 Proposed Action

The land surface of Area B at the proposed NMUSAF addition site is relatively flat. Site preparation for construction would involve minimal leveling. In addition, there would not be any subsurface building construction that would require extensive excavation. Therefore, with the exception of excavation for the footers, foundation, and rerouting and installing utility lines, the overall impact to soils in the vicinity would be minimal. Soil erosion would be minimized during construction using BMPs in accordance with

the Phase I NPDES stormwater discharge permit until the concrete slab would cover the soil, implementing erosion and sediment control measures.

All spills of hazardous chemicals, any materials entering sewers or drains, and releases of materials that have the potential to damage or pollute the environment would be reported to the Base Fire Department by calling 911 or calling the WPAFB Fire Dispatch.

In the short term, vehicles and heavy equipment would disturb the surface and compaction would be altered. Impacts would be minimized because erosion controls would be implemented. There would be no long-term adverse effects because disturbed vegetation as part of construction activities would be re-established.

4.4.3 No Action

The No Action alternative would have no impact on surface and subsurface soils.

4.5 Water Resources

4.5.1 Evaluation Criteria

Evaluation criteria for impacts on water resources are based on water availability, quality, and use; existence of floodplains; and associated regulations. Impacts would be adverse if proposed activities result in one or more of the following:

- Reduces water availability or supply to existing users
- Overdrafts groundwater basins
- Exceeds safe annual yield of water supply sources
- Affects water quality adversely
- Endangers public health by creating or worsening health hazard conditions
- Threatens or damages unique hydrologic characteristics
- Violates established laws or regulations adopted to protect water resources

4.5.2 Proposed Action

Groundwater and Surface Water

The groundwater and surface water systems that surround WPAFB are closely interconnected. Potential runoff contaminants from construction activities that could impact surface water quality could also impact groundwater quality. Therefore, they are analyzed together.

Construction activities for the NMUSAF addition would have minimal impact on groundwater at the site. During construction, the lawn area currently overlying the site would be removed exposing the upper surficial soil zone. This surficial soil is predominantly fill or silt/clay and is not considered hydraulically transmissive. Therefore, during construction and the relatively brief amount of time the soil would be exposed, infiltration of precipitation may increase slightly and the impact of the release of construction-

related materials (i.e., in the event of a minor spill) would be minimal to the upper water bearing zone below the surficial layer.

Construction and operation of the NMUSAF would have minimal impact on surface water quality with the exception of potential soil erosion and runoff during construction activities. The increase in the amount of impervious surface to this portion of Area B due to the proposed building and new access roads would be approximately 39,000 sf for new access roads and approximately 232,500 sf for Hangar 4. The total increase in impervious surface would be approximately 271,500 sf. The increased storm water flow from the new addition would be considered negligible providing the existing storm water system could accommodate this increase. The capacity of the storm water system would be evaluated during the design phase for the building.

No additional parking would be needed for the NMUSAF addition construction and operation, and there is an existing storm drain located due east of the proposed location. Soil erosion and sediment control measures would be required at the proposed construction site, along with spill prevention and mitigation measures. Care would be taken during construction activities involving concrete to ensure that these activities do not elevate stormwater pH.

Any leaks or spills that may occur during NMUSAF operation would be managed under a site-specific spill plan, designed to protect human health and the environment.

Building construction activities for the addition would involve minor land surface disturbance while the building and roadways are constructed. For land disturbances of five or more acres, a stormwater discharge permit would be required under the Phase I NPDES stormwater rule (USEPA 2005). A permit for discharge associated with disturbances greater than one-acre of land would be required under Stormwater Phase II Final Rule. The total area to be disturbed during the proposed project, including the NMUSAF addition and access driveways, would be approximately 15 acres. Therefore, a Phase I NPDES stormwater discharge permit would be required.

In addition, a construction permit for stormwater discharge from the OEPA would also be required. The following is the authorization statement for stormwater discharges associated with construction activities in accordance with OEPA Permit No. OHC000003 (expiration date April 20, 2013):

> ‘In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251) and the Ohio Water Pollution Control Act [Ohio Revised Code (ORC) Chapter 6111], discharges of stormwater from sites where construction activity is being conducted, as defined in Part 1.B of this permit, of are authorized by the Ohio EPA, to discharge from the outfalls at the sites and to the receiving surface waters of the State identified in their

Notice of Intent (NOI) application form on file with Ohio EPA in accordance with the conditions specified in Parts I through VII of this permit.'

In addition to the NPDES and construction permits, the project would also require the incorporation of sustainable stormwater designs in accordance with Section 438 of the Energy Independence and Security Act (EISA) of 2007. The EISA Section 438 requirement applies to any DoD construction project that increases impervious surfaces more than 5,000 s.f. and requires the agency to maintain or restore, to the extent technically feasible, the predevelopment hydrology with regard to the temperature, rate, volume, and duration of flow (DoD 2010).

Floodplains

According to EO 11988, *Floodplain Management*, any new construction in the regulatory floodplain must apply accepted flood protection to reduce the risk of flood-associated damages; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains.

The NMUSAF site is not located within the Mad River floodplain. Therefore, no impacts to floodplains would occur as a result of the Proposed Action

As part of the IICEP process for this EA, WPAFB requested input from MCD on the Proposed Action. The MCD responded in a letter dated November 2, 2012 indicating that since most of the proposed development is located downstream of the Huffman Dam, the proposed development would have no impact on the retarding basin. Copies of correspondence with MCD are provided in **Appendix B**.

4.5.3 No Action

The No Action alternative would have no adverse impact on water resources.

4.6 Biological Resources

Biological resources that could be impacted by the proposed project include vegetation, wildlife, threatened and endangered species, and wetlands; water availability, quality and use; existence of floodplains; and associated regulations.

4.6.1 Evaluation Criteria

Evaluation criteria for impacts on biological resources are based on:

- Importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource;
- Proportion of the resource that would be affected relative to its occurrence in the region;
- Sensitivity of the resource to the proposed activities; and
- Duration of ecological ramifications.

The impacts on biological resources would be adverse if species or habitats of high concern are negatively affected over relatively large areas. Impacts are also considered adverse if disturbances cause reductions in population size or distribution of a species of high concern.

As a requirement under the ESA, Federal agencies must provide documentation that ensures that agency actions do not adversely affect the existence of any threatened or endangered species. The ESA requires that all Federal agencies avoid "taking" threatened or endangered species (which includes jeopardizing threatened or endangered species habitat). Section 7 of the ESA establishes a consultation process with USFWS that ends with USFWS concurrence or a determination of the risk of jeopardy from a Federal agency project.

4.6.2 Proposed Action

Vegetation

Proposed construction activities would occur within areas previously disturbed and in grassy lawn areas that are frequently mowed. Land disturbing activities associated with construction under the Proposed Action would be limited to Base property. Short-term, localized effects on vegetation would be expected; however, due to the frequency of the vegetation types on and off base, negligible long-term or adverse effects on vegetation would be expected as a result of the implementation of the Proposed Action.

Wetlands

There are no wetlands currently known to occur near or within the project area associated with the construction of the NMUSAF addition. Therefore, no effects on wetlands are expected at WPAFB as a result of the Proposed Action.

Wildlife

Wildlife habitat within the improved areas of the Base is limited due to fragmentation by the existing facilities, roads, and impervious surfaces at WPAFB. The Proposed Action would have short-term, localized effects on habitat available to the terrestrial animals that occur at WPAFB due to the transient nature of terrestrial species in general. Additionally, this assessment is based on the limited extent of areas that would be affected by the Proposed Action and the frequency of occurrence of the terrestrial species known to occur at WPAFB. Therefore, no long-term or adverse effects on wildlife would be expected to result from the Proposed Action.

Threatened and Endangered Species

No construction activities would occur within areas where threatened or endangered species have been documented or within their potential habitat. Therefore, there would be no effect on threatened or endangered species or species of concern, candidate species, and potentially threatened species as a result of the construction activities associated with the Proposed Action.

While the Indiana bat is known to occur within areas across the Base, there is no prime foraging area or potential summer roost trees within the proposed project area. The Indiana bat would, therefore, not be impacted by the Proposed Action. In addition, the bald eagle, Eastern massasauga, clubshell, snuffbox, and rayed bean mussel are considered to be in the range of the NMUSAF; however, there is no suitable habitat for these species and therefore would not be impacted by the Proposed Action.

As part of the IICEP process for this EA, WPAFB requested informal consultation from USFWS on the Proposed Action. The USFWS reviewed the proposed project and determined that due to the project type, size, and location, the agency does not anticipate any impact on federally listed endangered, threatened, or candidate species, or their habitats. Copies of correspondence with USFWS are provided in **Appendix B**.

4.6.3 No Action

The No Action alternative would have no adverse impact on biological resources.

4.7 Cultural Resources

4.7.1 Evaluation Criteria

Adverse impacts on cultural resources might include physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or alter its setting; neglecting the resource to the extent that it deteriorates or is destroyed; or the sell, transfer, or lease of the property out of agency ownership (or control) without adequate legally enforceable restrictions or conditions to ensure preservation of the property's historic significance.

4.7.2 Proposed Action

The most relevant impacts in cultural resources at WPAFB would be related to the direct impacts from ground-altering activities. Construction activities under the Proposed Action would involve ground-disturbing activities in the area of the existing Museum; however, there are no known potential prehistoric site locations in the areas where ground-disturbing activities are planned. Furthermore, the area has been heavily disturbed in the past.

The proposed NMUSAF addition site is located within the Wright Field Historic District and several buildings associated with the NMUSAF are either listed as eligible for the NRHP and/or are listed on the WPAFB historic buildings inventory. The construction of Hangar 4 would not have an adverse effect on the historic properties, however, because five buildings of the NMUSAF already exist within the triangular runway area of Wright Field including two (Facilities 20487 and 20489) that are eligible for the NRHP for Cold War significance and a third (Facility 20494) that is potentially eligible. The design and construction of the new proposed building would be in keeping with the existing Museum buildings and the purpose of the new facility would be in keeping with the mission and use of the existing Museum facilities. The connection of the new building to the existing complex would not adversely affect the

historic buildings. Additionally, these buildings do not obscure the views from the historic flight line. The triangular runway area is a vast area and the intrusion into the area of existing buildings and that of a new fourth hangar would not significantly impact the feel of the space.

There are no significant archaeological resources within the triangular runway area of Wright Field that could be affected by construction of Hangar 4. There would be no impact to Wright Field Historic District and Facilities 20001 and 20009 when the presidential aircraft is relocated from these facilities to the proposed new hangar because the NMUSAF will continue to occupy and utilize these two facilities. Therefore, the proposed undertaking would have no adverse effect on the historic properties. The SHPO was consulted regarding the Proposed Action and responded in a letter indicating that the presence of another hangar would be in keeping with the existing museum buildings and the purpose of the new facility would be in keeping with the mission and use of the existing museum facilities. The SHPO also added that the new hangar would not obscure views from the historic flight line or compromise the view shed from within the Wright Field Historic District. The SHPO's concurrence letter stating the project would have no adverse effect on historic properties is included in **Appendix B**.

4.7.3 No Action

The No Action alternative would result in adverse impacts on cultural resources because the NMUSAF mission to preserve and interpret artifacts would be compromised.

4.8 Socioeconomics

4.8.1 Evaluation Criteria

Elements of the proposed project include the construction of a 224,000 sf addition to the existing Museum. The level of impacts is assessed in terms of direct effects on the local economy and related effects on other socioeconomic resources (e.g., housing). The magnitude of potential impacts can vary greatly, depending on the location of a proposed action. If potential socioeconomic changes were to result in substantial shifts in population trends or in adverse effects on regional spending and earning patterns, they would be considered adverse.

This section identifies potential economic and social impacts that might result from the proposed project. The methodology for the economic impact assessment is based on the Economic Impact Forecast System (EIFS) developed by the DoD in the 1970s to efficiently identify and address the regional economic effects of proposed military actions (EIFS 2001). EIFS provides a standardized system to quantify the impact of military actions, and to compare various options or alternatives in a standard, non-arbitrary approach.

The EIFS assesses potential impacts on four principal indicators of regional economic impact: business volume, employment, personal income, and population. As a "first tier" approximation of effects and their significance, these four indicators have proven very effective. The methodology for social impacts

is based on the Guidelines and Principles for Social Impact Assessment, developed by an inter-organizational committee of experts in their field (National Oceanic and Atmospheric Administration [NOAA] 1994).

The proposed project at WPAFB would have an adverse impact with respect to the socioeconomic conditions in the surrounding MA if it would:

- Change the local business volume, employment, personal income, or population that exceeds the MA's historical annual change; and/or
- Negatively affect social services or social conditions, including property values, school enrollment, county or municipal expenditures, or crime rates.

4.8.2 Proposed Action

A short-term beneficial impact would be expected on the local economy from revenue generated by construction activities. The Proposed Action would also have potential beneficial long-term effects from anticipated increase in visitors to the NMUSAF. The Proposed Action does not involve changes in off-Base land use or new development; therefore, no impacts on social conditions are anticipated.

In addition, EO 13045 requires that Federal agencies identify and assess environmental health and safety risks that might disproportionately affect children. The Proposed Action would not likely pose any adverse or disproportionate environmental health or safety risks to children living in the vicinity of the Base. The likelihood of the presence of children at the construction site where the Proposed Action would occur on Base is considered minimal, which further limits the potential for effects. Therefore, no adverse effects would be expected.

4.8.3 No Action

Under the No Action Alternative, minor short- and long-term adverse impacts would occur as the Museum's display of ever-growing military and space artifacts would not be available for public interpretation. Without the required space needed to display these artifacts, interpretation of artifacts and accessibility by Museum visitors would be impeded.

4.9 Environmental Justice

4.9.1 Evaluation Criteria

This section evaluates environmental justice concerns to include disproportionate impacts on low-income or minority populations. The proposed project at WPAFB would have an adverse impact with respect to environmental justice in the surrounding MA if it would disproportionately impact minority populations or low-income populations.

4.9.2 Proposed Action

As discussed in Section 3.9.1, the USAF has issued guidance on Environmental Justice analysis. To comply with EO 12898, ethnicity and poverty status in the study area have been examined and compared to state and national statistics to determine if minority or low-income groups could be disproportionately affected by the Proposed Action. The review indicates that residents living in the Riverside area have a lower per capita income, a higher percentage of persons without high school diplomas, and a higher percentage of residents living below the poverty level than county or state averages (Bureau of Census 2010b, 2010c). The review also indicates that the percentage of minority residents in Riverside is lower than county or state averages.

Potential adverse effects from the construction activities would occur on the Base, with no adverse effects anticipated off-Base. The environment around WPAFB and the NMUSAF is influenced by USAF operations, land management practices, vehicle traffic, and emissions sources outside the Base. Increased traffic from construction activities related to construction of the addition would affect local air quality, but these short-term effects would be dispersed and affect area residents and Base employees equally. The proposed addition to the NMUSAF would be performed by outside contractors with employees living within Montgomery and Greene Counties.

No disproportionate short- or long-term effects on minority or low-income populations from the Proposed Action are anticipated.

4.9.3 No Action

The No Action Alternative would have no impact over current conditions with respect to environmental justice.

4.10 Transportation and Infrastructure

4.10.1 Evaluation Criteria

Impacts on infrastructure are evaluated for their potential to disrupt or improve existing levels of service and additional needs for energy and water consumption, sanitary sewer systems, and transportation patterns and circulation. Impacts might arise from physical changes to circulation, construction activities, introduction of construction-related traffic on local roads or changes in daily or peak-hour traffic volumes, and energy needs created by either direct or indirect workforce and population changes related to Base activities.

4.10.2 Proposed Action

Transportation Systems

There would be a temporary increase in use of roadways in and around the NMUSAF as a result of construction traffic. Construction equipment would be driven to the project location and would be kept

on site during the duration of the project. All damaged transportation infrastructure from construction activities would be repaired.

The Proposed Action would affect traffic generation in the area of the NMUSAF and the adjacent city of Riverside over the short-term. Increases in traffic volumes and adverse impacts to traffic flow on-site are likely due to additional traffic entering, leaving, and cycling throughout the construction area as a result of contractors performing construction activities. In particular, there would be an overall increase in the volume of truck equipment traffic as a result of construction activities.

No long-term adverse impacts are anticipated because the number of visitors is expected to be similar to past years. Therefore, negligible effects on transportation systems would be expected under the Proposed Action.

Electrical Power/Utilities

The Proposed Action would result in a negligible net change in the electrical power system. Therefore, negligible adverse effects on the electrical power would be expected under the Proposed Action.

Short-term impacts to utilities would be minimized by following the procedures specified for "digging clearances". Underground utilities (i.e., storm sewers) in areas to be excavated would be marked by each division of base utilities. Proper excavation techniques would be used to ensure that existing underground utility lines are not damaged. Although the base has maps that describe the location of the utilities, there would be a potential for unmarked utilities. In the event a utility line is cut or otherwise damaged, on-site personnel would need to implement emergency procedures.

Procedures used to protect the utilities would be similar to those used to protect health and safety. When working with active electrical lines, a lock out/tag out procedure would be used. Use of cranes and other high-profile equipment would require a "spotter" to observe overhead hazards. Construction sites would have utility line trenches marked and warning signs would be used during construction activities.

From a conceptual standpoint, however, impacts associated with the installation and operation of Hangar 4 would be minimized as follows:

- Backflow prevention would be required for service lines to the potable water system. No additional impacts were identified.
- Storm water runoff from Hangar No. 4 would be expected to be handled by connecting to the existing storm sewer system at Hangar No. 3. No impacts were identified.
- If restrooms are constructed, a new lift station would be constructed to accommodate the additional waste water discharged from Hangar No. 4 and new lines would parallel existing sanitary sewer lines. The estimated new waste water volume would need to be coordinated with the City of Dayton publicly-owned treatment works.

- Natural gas would be supplied by the existing 4-inch main near Hangar No. 3. A new supply main may be required if supply and pressure are not adequate to handle the additional demand of Hangar No. 4. There would be no emissions with the exception of a pressure relief emergency situation vent.
- Explosion-proof containment construction would be provided for all utilities throughout the facility.

There would be minor long-term adverse impacts due to increased utility costs in operating Hangar 4; however, these costs would be offset by revenue generated from the operation of Hangar 4.

Natural Gas

The Proposed Action would result in a negligible, if any, net change in the natural gas system. Therefore, negligible adverse effects on natural gas demand would occur as a result of the Proposed Action.

Liquid Fuels

Under the Proposed Action, the liquid fuels system would be unchanged to accommodate the existing aircraft operations. Motorized equipment and vehicle operations are estimated to remain nearly unchanged under the Proposed Action. Therefore, there would be negligible effects on the liquid fuels system as a result of the Proposed Action.

Water Supply

The Proposed Action would result in a negligible increase of personnel and use of the water supply system resulting in a negligible increase in the demand for water. Therefore, there would be no adverse effects on the water supply system as a result of the Proposed Action.

Pollution Prevention

It is anticipated that the Proposed Action would not affect the Pollution Prevention Program at WPAFB. Quantities of hazardous material and chemical purchases, off-Base transport of hazardous waste, disposal of MSW, and energy consumption would continue at levels similar to current levels.

Solid Waste

In considering the basis for evaluating the level of impacts on solid waste, several items are considered. These items include evaluating the degree to which the proposed construction/renovation projects would affect the existing solid waste management program and capacity of the area landfill.

Solid waste generated from the proposed activities would consist of construction materials. Contractors are required to recycle construction waste to the greatest extent possible as part of Base policy, and any recycled construction waste would be diverted from landfills.

Long-term changes in solid waste generation due to the proposed construction activities would be minor. Therefore, the Proposed Action would have a minor, adverse impact on the solid waste management program at WPAFB.

Sanitary Sewer and Wastewater Systems

The Proposed Action would not result in a net change in the use of the sanitary sewer system. Therefore, no adverse impacts on the sanitary sewer system would result because of the Proposed Action.

Heating and Cooling

The Proposed Action would not result in a net change in heating and cooling systems usage. Therefore, no adverse impacts on heating and cooling systems would result from the Proposed Action.

Communications

The Proposed Action would not result in a net change in communications systems. Therefore, no adverse impacts on the communications system would result from the Proposed Action.

4.10.3 No Action

Under the No Action Alternative, there would be no change in baseline conditions and none of the proposed construction activities would occur. Therefore, there would be no impact on WPAFB's infrastructure.

4.11 Health and Safety

4.11.1 Evaluation Criteria

Impacts on health and safety are evaluated for their potential to jeopardize the health and safety of Base personnel as well as the surrounding public. Impacts might arise from physical changes in the work environment, construction activities, introduction of construction-related risks, and risks created by either direct or indirect workforce and population changes related to proposed Base activities.

The Air Force regulations and procedures promote a safe work environment and guard against hazards to the public. The WPAFB programs and day-to-day operations are accomplished according to applicable Air Force Federal and state health and safety standards.

4.11.2 Proposed Action

Fire Hazards and Public Safety

No adverse effects regarding fire hazards or public safety would be expected to occur from construction activities planned as part of the Proposed Action.

Munitions and Explosives Safety

No adverse effects to munitions or explosives safety would be expected to occur from construction

activities planned as part of the Proposed Action. The proposed Hangar 4 site is located at least 4,000 ft from Facility 20094, which is the closest active ESQD, and is located within the secure portion of Area B at WPAFB. The Tattoo fireworks display and the Air Force Marathon are annual events conducted at WPAFB in close proximity to the NMUSAF; however, the Museum is closed during the fireworks display and the marathon event only uses a racegun to begin the start of the event.

Construction and Demolition Safety

Short-term minor adverse effects would be expected from construction activities. Implementation of the Proposed Action would slightly increase the short-term risk associated with contractors performing the construction activities at WPAFB during the normal work day.

Contractors would be required to establish and maintain safety programs, and adhere to SOPs. Construction of the addition would not pose a safety risk to NMUSAF personnel or visitors or to activities at the NMUSAF and the Base.

Any potential adverse impacts to the health and safety of nearby personnel would be minimized by clearly identifying the work zone and prohibiting access to unauthorized individuals. Use of high-profile equipment would require a "spotter" when operating near any overhead hazards. To minimize vehicle accidents, construction personnel would direct heavy vehicles entering and exiting the site. WPAFB has also incorporated stringent safety standards and procedures into day-to-day operations. Therefore, no adverse effects are anticipated as a result of the Proposed Action due to safeguards existing to protect personnel/visitors.

As a result of the Proposed Action, potential minor short-term impact to the safety of construction workers would be expected but would be minimized by adherence to safety regulations and standards. No long-term impacts are expected to the health and safety of NMUSAF personnel or visitors as a result of the Proposed Action.

Anti-Terrorism/Force Protection

No adverse effects to ATFP would be expected to occur from construction of Hangar 4. Construction projects under the Proposed Action would include required ATFP measures and conform to applicable State of Ohio and WPAFB building codes and regulations.

4.11.3 No Action

The No Action Alternative would have no impact to the health and safety of NMUSAF personnel and/or visitors.

4.12 Hazardous Materials and Wastes and Environmental Restoration Program Sites

4.12.1 Evaluation Criteria

Impacts to hazardous material management would be considered adverse if the Federal action resulted in noncompliance with applicable Federal and state regulations, or increased the amounts generated or procured beyond current WPAFB waste management procedures and capacities.

Impacts on pollution prevention would be considered adverse if the Federal action resulted in worker, resident, or visitor exposure to these materials, or if the action generated quantities of these materials beyond the capability of current management procedures. Impacts on the ERP would be considered adverse if the Federal action disturbed (or created) contaminated sites resulting in negative effects on human health or the environment.

4.12.2 Proposed Action

Hazardous Materials

Products containing hazardous materials would be procured and used during the proposed construction activities. It is anticipated that the quantity of products containing hazardous materials used during these activities would be minimal and their use would be of short duration. Contractors would be responsible for the management of hazardous materials, which would be handled in accordance with Federal and state regulations. Therefore, hazardous materials management at WPAFB would not be impacted by the proposed construction of Hangar 4.

Hazardous Wastes

It is anticipated that the quantity of hazardous wastes generated from proposed construction activities would be negligible. Contractors would be responsible for the disposal of hazardous wastes in accordance with Federal and state laws and regulations. Construction of the NMUSAF addition would not impact the Base's hazardous waste management program.

It is anticipated that the volume, type, classifications, and sources of hazardous wastes associated with the Proposed Action would be similar in nature with the baseline condition waste streams. Hazardous waste would be handled, stored, transported, disposed of, or recycled in accordance with the WPAFB Hazardous Waste Management Plan. Therefore, it is anticipated that the Proposed Action would result in negligible adverse impacts to hazardous materials at WPAFB.

Asbestos-Containing Material and Lead-Based Paint

No facilities would be renovated/modified as part of the Proposed Action. In addition, neither ACM nor LBP would be used in the construction of a new facility, therefore, the potential for adverse impacts would be negligible.

Environmental Restoration Program

There would be minimal ground disturbance under the Proposed Action in association with the construction of Hangar 4. However, construction activities planned under the Proposed Action do not involve ground disturbance within or adjacent to any ERP sites. Therefore, the Proposed Action would result in negligible adverse impacts to hazardous materials.

4.12.3 No Action

The No Action alternative would have no adverse impact on hazardous materials storage and waste generation.

4.13 Cumulative Impacts

The CEQ regulations (40 CFR 1508.7) require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts on environmental resources result from incremental effects of proposed actions, when combined with other past, present, and reasonably foreseeable future projects in the area. Cumulative impacts can result from individually minor, but collectively substantial, actions undertaken over a period of time by various agencies (Federal, state, and local) or individuals. Informed decision-making is served by consideration of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the foreseeable future.

Projects proposed for the reasonably foreseeable future that are relevant to the project area include the following ancillary projects for WPAFB and adjacent city of Riverside.

Entry Control Facility Reconfiguration and Base Perimeter Fence Relocation – Proposed plans include reconfiguring and relocating the existing nine entry control facilities (gates) located in Area A. This project would not be expected to impact the proposed construction of the NMUSAF addition due to the distance of the NMUSAF to Area A.

Information Technology Center **–** This proposed project involves new construction in Area B located west of the AFIT campus. This project, should it be constructed as anticipated, is not expected to result in any cumulative impacts associated with the Proposed Action.

Radar Tomography Range and Equipment Storage Facility – A radar tomography range is proposed for construction at Tillman Pit located in the southwest corner of Area B (southwest of the NMUSAF). The purpose of this facility is to improve the efficiency of the Air Force Research Laboratory Sensors Directorate research and development activities. The project includes construction of a range including tower foundations, utilities, access roads, and parking spaces.

Center of Flight – The Center of Flight project consists of an 18-acre undeveloped parcel located in the city of Riverside that is zoned for commercial development. This property is located across the road from the NMUSAF. The City of Riverside currently has this property for sale and advertises over 1,200 ft of frontage on Springfield Pike, immediate interstate access, and state and local incentives available (Riverside 2012).

This project, should it be constructed as anticipated, would not be expected to result in adverse cumulative impacts associated with the Proposed Action. This development could potentially be mutually beneficial to the NMUSAF and the city of Riverside as visitors to the area would use both areas.

4.14 Unavoidable Adverse Effects

Unavoidable adverse impacts would result from implementation of the Proposed Action.

Noise. The noise resulting from construction activities and equipment is an unavoidable condition. Although this noise would occur under the Proposed Action, the noise would be temporary and would cease upon completion of the construction activities. Noise is not considered an adverse impact.

Safety. The potential for worker safety mishaps and the generation of hazardous and construction wastes are unavoidable conditions associated with the Proposed Action. However, the potential for these unavoidable situations would not increase over baseline conditions.

Energy. The use of nonrenewable resources is an unavoidable occurrence, although this use is negligible compared with total use of energy. The operation of Hangar 4 would require the use of additional fossil fuels, a nonrenewable natural resource. Energy supplies, although relatively small, would be committed to the Proposed Action or No Action alternative.

Geology and Soils. Under the Proposed Action, construction of the new addition would result in soil disturbance. Implementation of BMPs during construction would limit potential impacts resulting from construction activities. Standard erosion control means would also reduce potential impacts related to these characteristics.

4.15 Relationship of Short-Term Uses and Long-Term Productivity

Short-term uses of the biophysical components of man's environment include direct construction-related disturbances and direct impacts associated with an increase in population and activity that occur over a period of less than 5 years. Long-term uses of human environment include those impacts occurring over a period of more than 5 years, including permanent resource loss.

The Proposed Action would not result in intensification of land use at WPAFB or the surrounding area. Development of the Proposed Action would not represent a loss of open space. Therefore, it is

anticipated that the Proposed Action would not result in any cumulative land use or aesthetic impacts. Long-term productivity of the project area would be increased by the implementation of the Proposed Action.

In the short-term, constructing the addition to the Museum would enhance the NMUSAF's mission of providing an adequate facility to display its ever-growing collection of historical artifacts. The Proposed Action would result in long-term socioeconomic benefits because the NMUSAF would continue to attract millions of visitors a year nationwide and from foreign countries and would posses an adequate facility to display material to educate the general public and to train Air Force personnel in the technical and historic heritage of their service in the USAF.

4.16 Irreversible and Irretrievable Commitments of Resources

The irreversible environmental changes that would result from implementation of the Proposed Action involve the consumption of material resources, energy resources, land, biological habitat, and human resources. The use of these resources is considered to be permanent.

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that use of these resources will have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable time frame (e.g., energy and minerals).

Material Resources. Material resources used for the Proposed Action include concrete and various material supplies. Most of the materials that would be consumed are not in short supply and would not limit other unrelated construction activities.

Energy Resources. Energy resources used for the Proposed Action would be irretrievably lost. These include petroleum-based products, such as gasoline, diesel, natural gas, and electricity. During construction, gasoline and diesel would be used for the operation of construction vehicles. During operation, gasoline would be used for the operation of private and government-owned vehicles. Natural gas and electricity would be used by operational activities. Consumption of these energy resources would not place an overburdening demand on their availability in the region.

Human Resources. The use of human resources for construction and operation is considered an irretrievable loss, only in that it would preclude such personnel from engaging in other work activities. However, the use of human resources for the Proposed Action represents employment opportunities, and is considered beneficial.

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Years of Experience: 22

Timothy Rust
Shaw Environmental & Infrastructure, Inc.
Air Quality
B.S. Electrical Engineering
Years of Experience: 18

William Scoville
Shaw Environmental & Infrastructure, Inc.
Program Manager, Senior Review
M.S. Civil Engineering
B.S. Earth and Engineering Sciences
Years of Experience: 26

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6.0 LIST OF PERSONS CONTACTED

Several persons were contacted or consulted during the preparation of the EA. The persons contacted are listed below:

Name	Role	Affiliation
JoLynn Anderson	Chief Planning and Real Property	88 ABW/CEAOR
Karen Beason	EIAP Manager	88 ABW/CEAOR
Justin Cook	Resource Protection and Review	Ohio Historic Preservation Office
William Curtis II	88 ABW Weapons Safety Manager	88 ABW/SEW
Roxanne Farrier	Floodplain Issues	Miami Conservancy District
Mary Knapp	Threatened and Endangered Species	U.S. Fish and Wildlife Services
Thomas Kuepper	Program Manager, Wright Field Facilities Team	88 ABW/CEPMW
John Marang	Chief of Operations	NMUSAF/MUO
Greg Schneider	Natural Resources	Ohio Department of Natural Resources; Division of Natural Areas & Reserves; Columbus, Ohio
Thomas Sylvester	NMUSAF Facility Manager	NMUSAF/MUO
Darryn Warner	Natural Resources Program Manager	88 ABW/CEANQ
Paul Woodruff	Cultural Resources Program Manager	88 ABW/CEANQ

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Appendix A

Photographs

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	10/30/12	--	JJS	SB	CH	s-147112.0601-10/12-w

1. Looking north toward the NMUSAF entrance.

2. Looking northwest across the proposed Hangar 4 site (grassy lawn) toward existing Hangar 3 and the Hall of Missiles.

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	10/30/12	--	JJS	SB	CH	s-147112.0601-10/12-w

3. Looking northeast toward existing Hangar 3.

4. Looking southwest toward existing Hangar 3 and the proposed Hangar 4 site.

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	10/30/12	--	JJS	SB	CH	s-147112.0601-10/12-w

5. Looking southeast at the NMUSAF Memorial Park located adjacent and southwest of Hangar 1.

6. Looking southeast toward Facilities 20001 and 20009, which currently display the NMUSAF's Presidential aircraft collection.

Appendix B

Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) Correspondence

Notice of Availability

PUBLIC NOTICE

Notice of Availability

Draft Final Finding of No Significant Impact for the Environmental Assessment of the National Museum of the United States Air Force Addition at Wright-Patterson Air Force Base, Ohio

WRIGHT-PATTERSON AFB – Beginning January 16, 2013 through February 14, 2013, Environmental Management officials will accept comments on the Environmental Assessment (EA) for the National Museum of the United States Air Force Addition at Wright-Patterson Air Force Base (WPAFB), Ohio. The U.S. Air Force is proposing to issue a Finding of No Significant Impact (FONSI) based on the EA. The analysis considered potential effects of the Proposed Action and the No Action Alternative on twelve resource areas: land use, air quality, noise, geology and soil, water resources, biological resources, cultural resources, socioeconomic resources, environmental justice, infrastructure, health and safety, and hazardous materials/ hazardous wastes. The Proposed Action considered constructing the addition to the existing National Museum of the United States Air Force (NMUSAF) and its subsequent operation at WPAFB. The results found in the EA show that the Proposed Action would not have an adverse impact on the natural or human environment—indicating that a FONSI would be appropriate. An Environmental Impact Statement should not be necessary to implement the Proposed Action.

Copies of the Draft Final EA and FONSI showing the analysis are available for review at the Fairborn Library, 1 East Main Street, Fairborn, OH 45324.

Written comments and inquiries on the EA and FONSI should be directed to:

Ms. Karen Beason, EIAP Program Manager
88 ABW/CEAOR, 1450 Littrell Road, Bldg 22
Wright-Patterson AFB, Ohio 45433-5209
(937) 257-5899
karen.beason@wpafb.af.mil

PUBLIC NOTICE

Notice of Availability

Draft Final Finding of No Significant Impact for the Environmental Assessment of the National Museum of the United States Air Force Addition at Wright-Patterson Air Force Base, Ohio

WRIGHT-PATTERSON AFB – Beginning January 17, 2013 through February 15, 2013, Environmental Management officials will accept comments on the Environmental Assessment (EA) for the National Museum of the United States Air Force Addition at Wright-Patterson Air Force Base (WPAFB), Ohio. The U.S. Air Force is proposing to issue a Finding of No Significant Impact (FONSI) based on the EA. The analysis considered potential effects of the Proposed Action and the No Action Alternative on twelve resource areas: land use, air quality, noise, geology and soil, water resources, biological resources, cultural resources, socioeconomic resources, environmental justice, infrastructure, health and safety, and hazardous materials/ hazardous wastes. The Proposed Action considered constructing the addition to the existing National Museum of the United States Air Force (NMUSAF) and its subsequent operation at WPAFB. The results found in the EA show that the Proposed Action would not have an adverse impact on the natural or human environment—indicating that a FONSI would be appropriate. An Environmental Impact Statement should not be necessary to implement the Proposed Action.

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Written comments and inquiries on the EA and FONSI should be directed to:

Ms. Karen Beason, EIAP Program Manager
88 ABW/CEAOR, 1450 Littrell Road, Bldg 22
Wright-Patterson AFB, Ohio 45433-5209
(937) 257-5899
karen.beason@wpafb.af.mil

Ohio Department of Natural Resources Consultation Letters:

1. **Shaw Request – 30Oct12**
2. **ODNR Response – 05Nov12**

Shaw Environmental & Infrastructure, Inc.
5050 Section Avenue
Cincinnati, OH 45212
513.782.4700
Fax: 513.782.4807

Shaw Environmental & Infrastructure, Inc.

October 30, 2012

Mr. Greg Schneider
Ohio Department of Natural Resources
Division of Wildlife
Ohio Biodiversity Database Program
2045 Morse Road, Building G-3
Columbus, Ohio 43229-6693

Subject: Rare Species Data Request and Informal Consultation
Environmental Assessment for the Addition to the National Museum of the United States Air Force
Wright-Patterson Air Force Base, Ohio

Dear Mr. Schneider:

The purpose of this letter is to request information from the National Heritage Program for State and Federally-listed threatened or endangered plants and animals in the vicinity of the existing National Museum of the United Air Force (NMUSAF) located in Area B at Wright-Patterson Air Force Base (WPAFB). The NMUSAF requires an adequate facility to display its ever-growing collection of space vehicles and other historical artifacts that depict the material history of the USAF. The material is displayed to educate the general public and to train Air Force personnel in the technical and historic heritage of their service in the USAF. The proposed addition would permit consolidation and integration of items currently on display with new acquisitions.

The geographic location of the proposed project area is Montgomery County, Bath Township, in Sections 17 and 18, Township 7 North, and Range 2 East (-84.11° longitude, 39.781° latitude) as shown on Figure 1.

The NMUSAF (Museum) is proposing to construct an approximately 224,000 square foot (sf) addition to the existing museum complex. The addition would be referred to as "Hangar 4" and would be constructed approximately 195 ft south of Hangar 3 in a parallel configuration (Figure 2). Concrete tow lanes would extend from existing Hangar 3 tow lanes and would provide access to the doors on the east and west ends of Hangar 4. The addition would be similar to Hangar 3 in size and appearance. A connector with Hangar 3 would be constructed for the purpose of continuing the main circulation spine from Hangar 3 and connect into the north side of the Hangar 4 exhibit space. The connector would allow for circulation around the existing central stairs of the Hall of Missiles (Hangar 3) and into curved corridors that bring the circulation flow back into a single spine before entering into the proposed Hangar 4 exhibit space.

Hangar 4 would be designed to support exhibits on a reinforced concrete slab-on-grade to accommodate aircraft point loads. The minimum slab thickness to resist the space shuttle display is 12 inches. The minimum slab thickness to resist the C-5 display is 9 inches. The footprint would be approximately 224,000 sf and constructed of structural steel truss arches pinned at the foundation connections and rising to approximately 88 feet above the finish floor. The design of Hangar 4 would be architecturally compatible with the interior and exterior of the existing Museum (Figure 3).

We are currently preparing an Environmental Assessment (EA) under contract to WPAFB. The intent of the EA is to satisfy requirements under the National Environmental Policy Act of 1969. We are requesting the locations of known populations of rare, threatened and endangered species within a one mile radius of this project site as part of this assessment. For the Indiana bat, we are requesting information within a five-mile radius. We would also like to request informal consultation regarding possible impacts of this proposed project on species listed as threatened or endangered.

Under the No Action Alternative, there would be no addition constructed to the existing NMUSAF and the Museum would not have a location for the preservation and interpretation of artifacts from the space program and the air mobility mission. The Museum's collection of Presidential aircraft would not be readily available to the public and would continue to provide limited access to the public due to its current location in a secure area on WPAFB. Under the No Action Alternative, the artifacts currently displayed outside would continue to deteriorate. The continued wear on those artifacts due to exposure to the elements is contrary to the preservation of artifacts. The mission of the NMUSAF to preserve, display, and interpret the rich history of the USAF would be compromised.

The form for our Data Request is attached. We would appreciate any information from your database that applies to our project area. Please let us know if you concur with the no effect determination. Please contact me at 513/782-4967 or by email at Cindy.Hassan@shawgrp.com if you have any questions. Thank you for your consideration.

Sincerely,

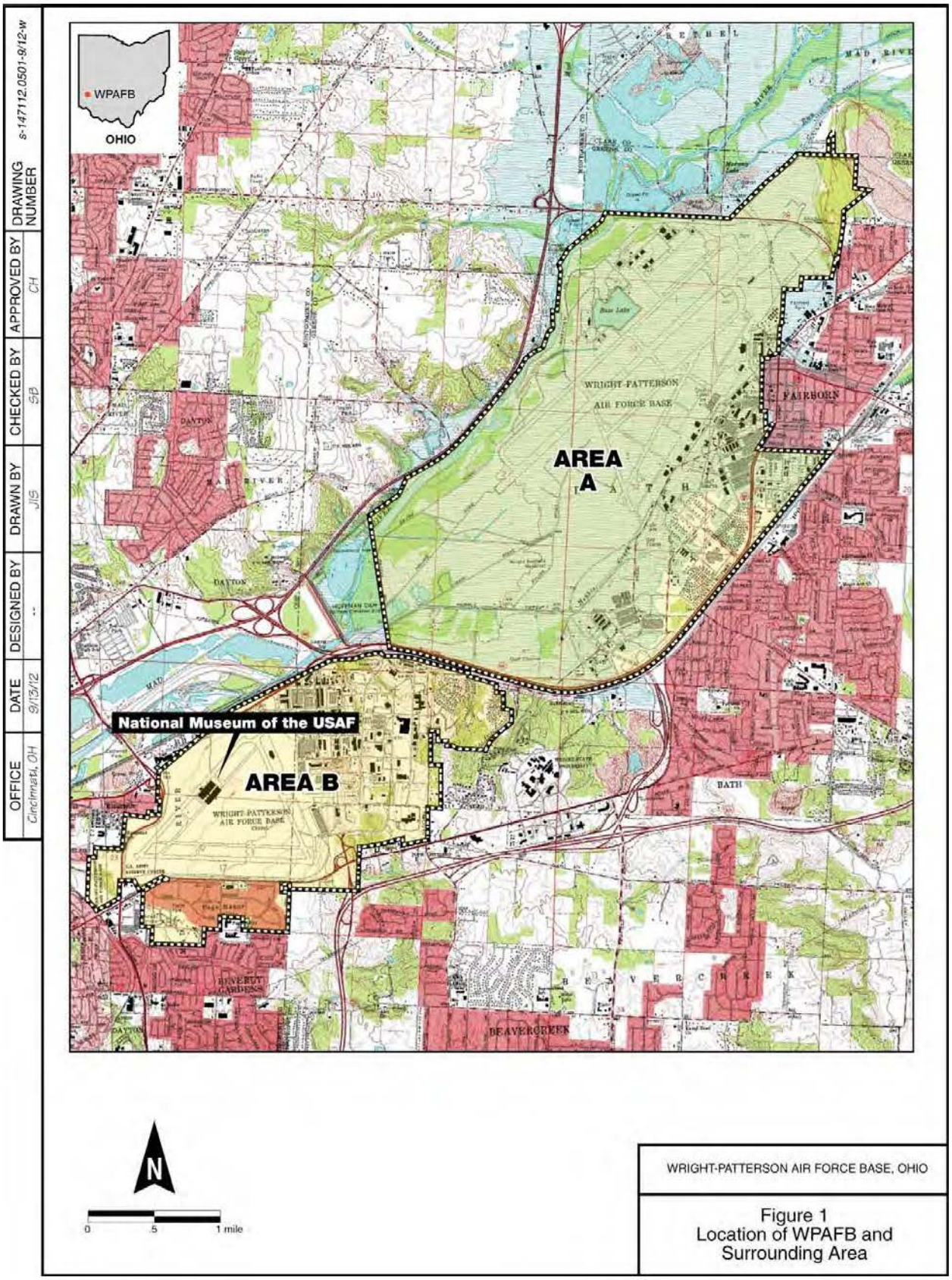
SHAW ENVIRONMENTAL & INFRASTRUCTURE, INC.

Cynthia A. Hassan

Cynthia A. Hassan
Project Manager

cc: Karen Beason (88 ABW/CEAOR, WPAFB)

Attachments: Figure 1 – Location of WPAFB and Surrounding Area
Figure 2 – Location of Proposed NMUSAF Addition
Figure 3 – NMUSAF Addition Rendering
Enclosure: Ohio Biodiversity Database Program Data Request Form



WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 1
Location of WPAFB and Surrounding Area

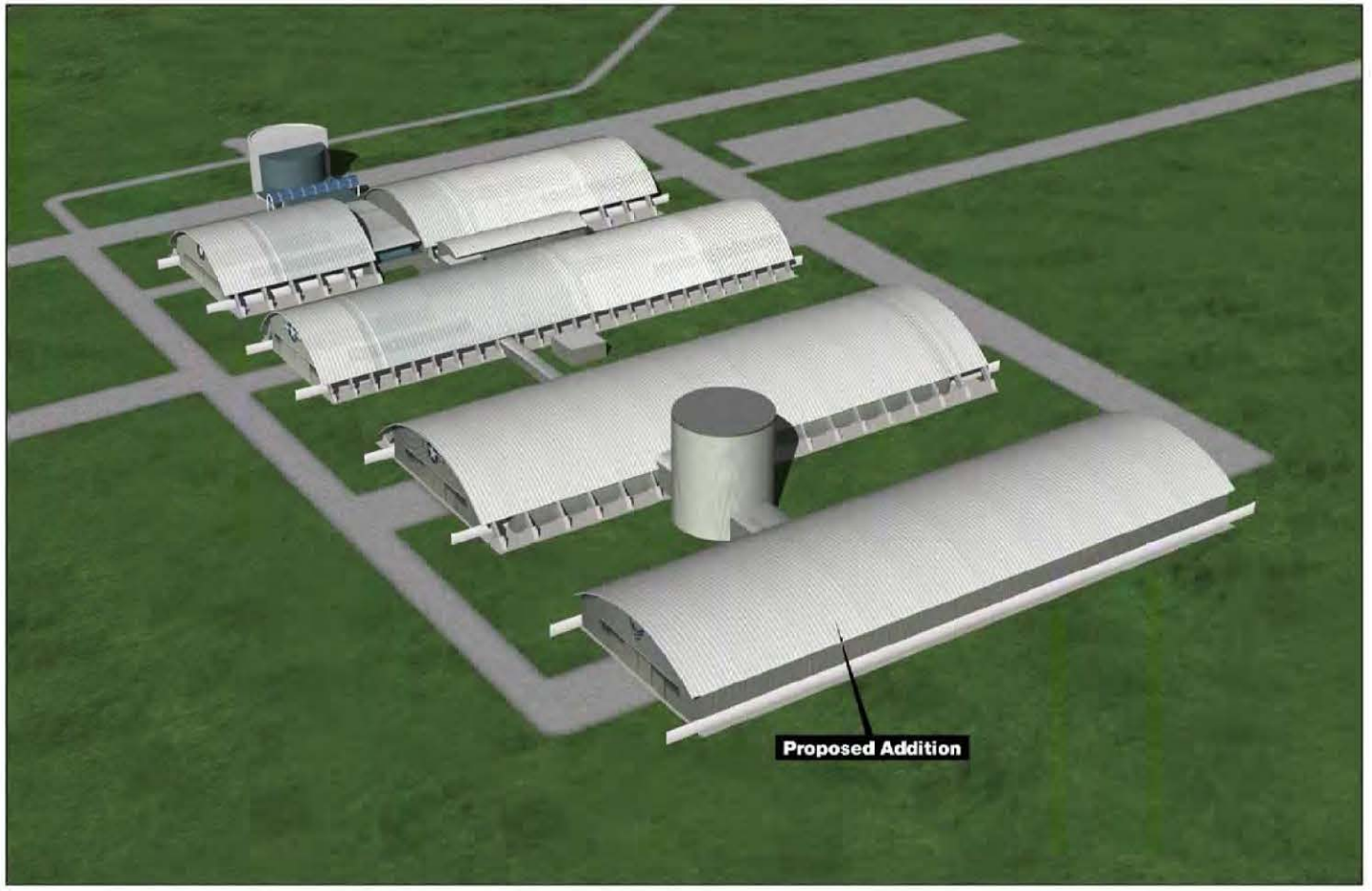
OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	9/19/12	--	JIS	SB	CH	s-147112.0501-9/12-w

N

WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 2
Location of Proposed
NMUSAF Addition

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	9/9/12	–	JIS	SB	CH	s-147112.0501-9/12-w



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WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 3
NMUSAF Addition
Rendering

Ohio Department of Natural Resources
JOHN R. KASICH, GOVERNOR JAMES ZEHRINGER, DIRECTOR

Ohio Division of Wildlife
Scott Zody, Chief
2045 Morse Rd., Bldg. G
Columbus, OH 43229-6693
Phone: (614) 265-630

November 5, 2012

Ms. Cynthia Hassan
Shaw Environmental & Infrastructure, Inc.
5050 Section Avenue
Cincinnati, OH 45212-2025

Dear Ms. Hassan

I have reviewed the Natural Heritage Database for the National Museum of the Air Force, Wright-Patterson AFB project area, including a one mile radius, in the City of Riverside, Montgomery County, Ohio. We have a 2012 record for a Bald Eagle Nest in your search area. A map showing the location of this nest is provided with this letter.

I have also performed a search for Indiana Bat (*Myotis sodalis*) capture sites within a five mile radius and hibernacula within a ten mile radius of the project site. There is a capture record within five miles of your project area. However, please note that we no longer give out specific location data on this sensitive species.

We are unaware of any additional unique ecological sites, geologic features, animal assemblages, scenic rivers, state wildlife areas, nature preserves, parks or forests, national wildlife refuges, parks or forests, or other protected natural areas within a one mile radius of the project area.

Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. Please note that although we inventory all types of plant communities, we only maintain records on the highest quality areas.

This letter only represents a review of rare species and natural features data within the Ohio Natural Heritage Database. It does not fulfill coordination under the National Environmental Policy Act (NEPA) or the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S. C. 661 et seq.) and does not supersede or replace the regulatory authority of any local, state or federal agency nor relieve the applicant of the obligation to comply with any local, state or federal laws or regulations.

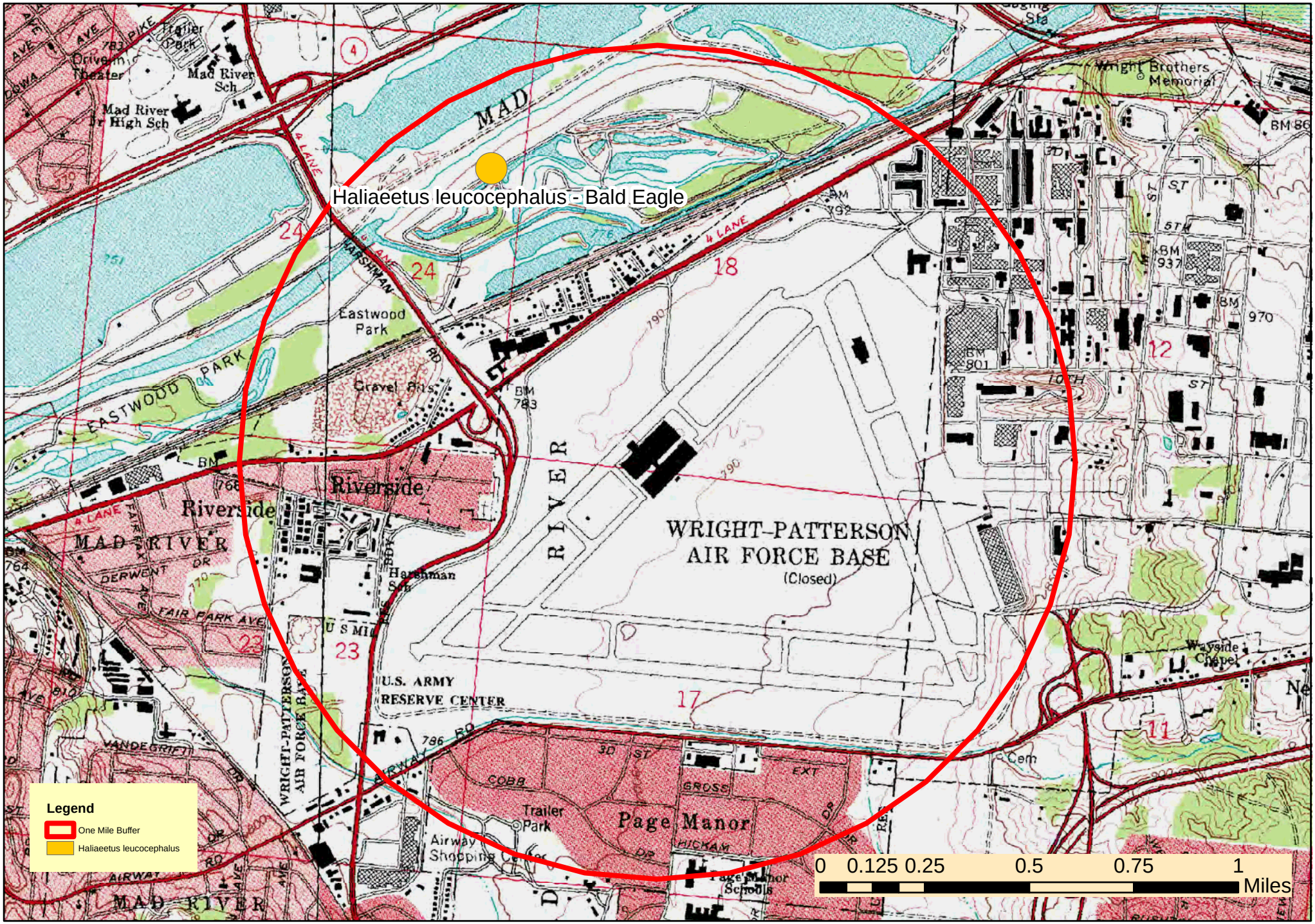
Please contact me at 614-265-6452 if I can be of further assistance.

Sincerely,

Greg Schneider

Greg Schneider, Administrator
Ohio Natural Heritage Program

National Museum of the Air Force, Wright-Patterson AFB



U.S. Fish & Wildlife Service Consultation Letters:

1. **WPAFB Request – 29Oct12**
2. **USFWS Response – 06Nov12**

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 88TH AIR BASE WING (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

29 October 2012

88 ABW/CEANQ
1450 Littrell Road, Building 22
Wright-Patterson AFB OH 45433-5209

Dr. Mary Knapp
U.S. Fish and Wildlife Service
Ecological Services
4625 Morse Road, Suite 104
Columbus OH 43230

RE: Informal Section 7 Consultation, National Museum of the United States Air Force, Wright-Patterson AFB, Ohio

Dear Dr. Knapp:

Wright-Patterson Air Force Base (WPAFB) is preparing an Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 to address environmental impacts associated with the proposal to construct an addition to the National Museum of the United States Air Force (NMUSAF) in Area B at WPAFB. By way of this letter, WPAFB is seeking informal Section 7 consultation for the proposed project action. The following species are considered to be in the range of the proposed project area:

1. Bald eagle (*Haliaeetus leucocephalus*), protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act
2. Indiana bat (*Myotis sodalis*), a federally endangered species
3. Eastern massasauga (*Sistrurus catenatus*), a federal candidate species
4. Clubshell mussel (*Pleurobema clava*), a federally endangered species
5. Snuffbox mussel (*Epioblasma triquerta*), a species proposed for listing as federally endangered
6. Rayed bean mussel (*Villosa fabalis*), a species proposed for listing as federally endangered

Proposed Action

The NMUSAF (Museum) is proposing to construct an approximate 224,000 square foot (sf) addition to the existing museum. The addition would be referred to as "Hangar 4" and would be constructed approximately 195 feet south of Hangar 3 in a parallel configuration (Figure 2). Concrete tow lanes would extend from existing Hangar 3 tow lanes and would provide access to the doors on the east and west ends of Hangar 4. The addition would be similar to Hangar 3 in size and appearance. A connector with Hangar 3 would be constructed for the purpose of continuing the main circulation spine from Hangar 3 and connect into the north side of the Hangar 4 exhibit space. The connector would allow for circulation around the existing central stairs of the Hall of Missiles (Hangar 3) and into curved corridors that bring the circulation flow back into a single spine before entering into the proposed Hangar 4 exhibit space.

Hangar 4 would be designed to support exhibits on a reinforced concrete slab-on-grade to accommodate aircraft point loads. The minimum slab thickness to resist the space shuttle display is 12 inches. The minimum slab thickness to resist the C-5 display is 9 inches. The footprint would be approximately 224,000 sf and constructed of structural steel truss arches pinned at the foundation connections and rising to approximately 88 feet above the finish floor. The design of Hangar 4 would be architecturally compatible with the interior and exterior of the existing Museum (Figure 3). WPAFB is requesting concurrence that the proposed action would have no effect and may affect, not likely to adversely affect the 6 species as described below.

- The bald eagle is protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The nearest bald eagle nest is over 1.5 miles from the base. While suitable habitat may be present within WPAFB, this habitat is not within the areas proposed to be impacted and the proposed project areas are not located within ½ mile of any known eagle nesting site; therefore, WPAFB has determined there will be no effect to the bald eagle.

- The Indiana bat is a federally endangered species. Mist net surveys in 2000 and 2007 detected Indiana bats within the base. Summer habitat requirements for the species are not well defined but the following are considered important:

  (1) dead or live trees and snags with peeling or exfoliating bark, split tree trunk and/or branches, or cavities, which may be used as maternity roost areas;
  (2) live trees (such as shagbark hickory and oaks) which have exfoliating bark;
  (3) stream corridors, riparian areas, and upland woodlots which provide forage sites.

  The WPAFB Integrated Natural Resources Management Plan previously identified wooded areas approximately 5,000 feet to the southwest of the project area and wooded areas approximately 4,000 feet southeast of the project area as potentially suitable roosting habitats for the Indiana bat. There are no trees in the vicinity of the project that would be removed from the proposed project site, and as such, WPAFB has determined that there would be no effect to the Indiana bat.

- Eastern massasauga rattlesnake is a federal candidate. The eastern massasauga is potentially present at WPAFB with records from the Warfighter Training Center (formerly Prime BEEF Training Area) and Twin Base Golf Course. Although the last documented record was from 1993 in the Warfighter Training Center, recent base wide survey efforts have been ongoing to try to detect the presence or probable absence of the species within the base. Eastern massasaugas use both upland and wetland habitat and these habitats differ by season. During the winter, massasaugas hibernate in low wet areas, primarily in crayfish burrows, but may use other structures. Presence of a water table near the surface is important for a suitable hibernaculum. In the summer, massasaugas use drier, open areas that contain a mix of grasses and forbs such as goldenrods and other prairie plants that may be intermixed with trees or shrubs. Adjoining lowland and upland habitat with variable elevations between are critical for the species to travel back and forth seasonally. As currently proposed, the project area is located in an area that is regularly mowed and previously disturbed; therefore, WPAFB has determined there would be no effect to the eastern massasauga from the Proposed Action.

- Clubshell is a federally listed endangered freshwater mussel. Neither the species nor the habitat exists within the proposed project area. The clubshell inhabits areas with sand or gravel substrate and also prefers areas with riffles and runs. The clubshell is potentially present in the Little Miami River and drainages where preferred habitat exists. The nearest stream is located approximately 2,500 feet south of the project area. This stream would not be impacted, as construction activities would be limited to the vicinity of the existing museum complex as indicated in Figure 2; therefore, WPAFB has determined there would be no effect on the clubshell from the Proposed Action.

- Snuffbox is a federally listed endangered freshwater mussel. Neither the species nor the habitat exists within the proposed project area. The snuffbox occurs in swift currents of riffles and shoals over sand and gravel with occasional cobble and boulders. The snuffbox is known to be present in the Stillwater and Little Miami Rivers and drainages where preferred habitat exists. The nearest stream is located approximately 2,500 feet south of the project area. This stream would not be impacted, as construction activities would be limited to the vicinity of the existing museum complex as indicated in Figure 2; therefore, WPAFB has determined there would be no effect on the snuffbox from the Proposed Action.

- Rayed bean is a federally listed freshwater mussel. Neither the species nor the habitat exists within the proposed project area. The rayed bean is generally known from smaller headwater creeks, but records exist in larger rivers. They are usually found in or near shoal or riffle areas, and in the shallow, wave-washed areas of lakes. Substrates typically include sand and gravel, and are often associated with, and buried under the roots of, vegetation, including the water willow (*Justica americana*) and water milfoil (*Myriophyllum* sp.). The rayed bean is known to be present in the Great Miami River and is potentially present in perennial streams in Greene and Montgomery Counties where preferred habitat exists. The nearest stream is located approximately 2,500 feet south of the project area. This stream would not be impacted, as construction activities would be limited to the vicinity of the existing museum complex as indicated in Figure 2; therefore, WPAFB has determined there would be no effect on the rayed bean from the Proposed Action.

For these reasons, we conclude that constructing the addition to the NMUSAF would have no effect on the bald eagle, eastern massasauga clubshell mussel, snuffbox mussel, rayed bean mussel or the Indiana bat. We request concurrence with our determinations.

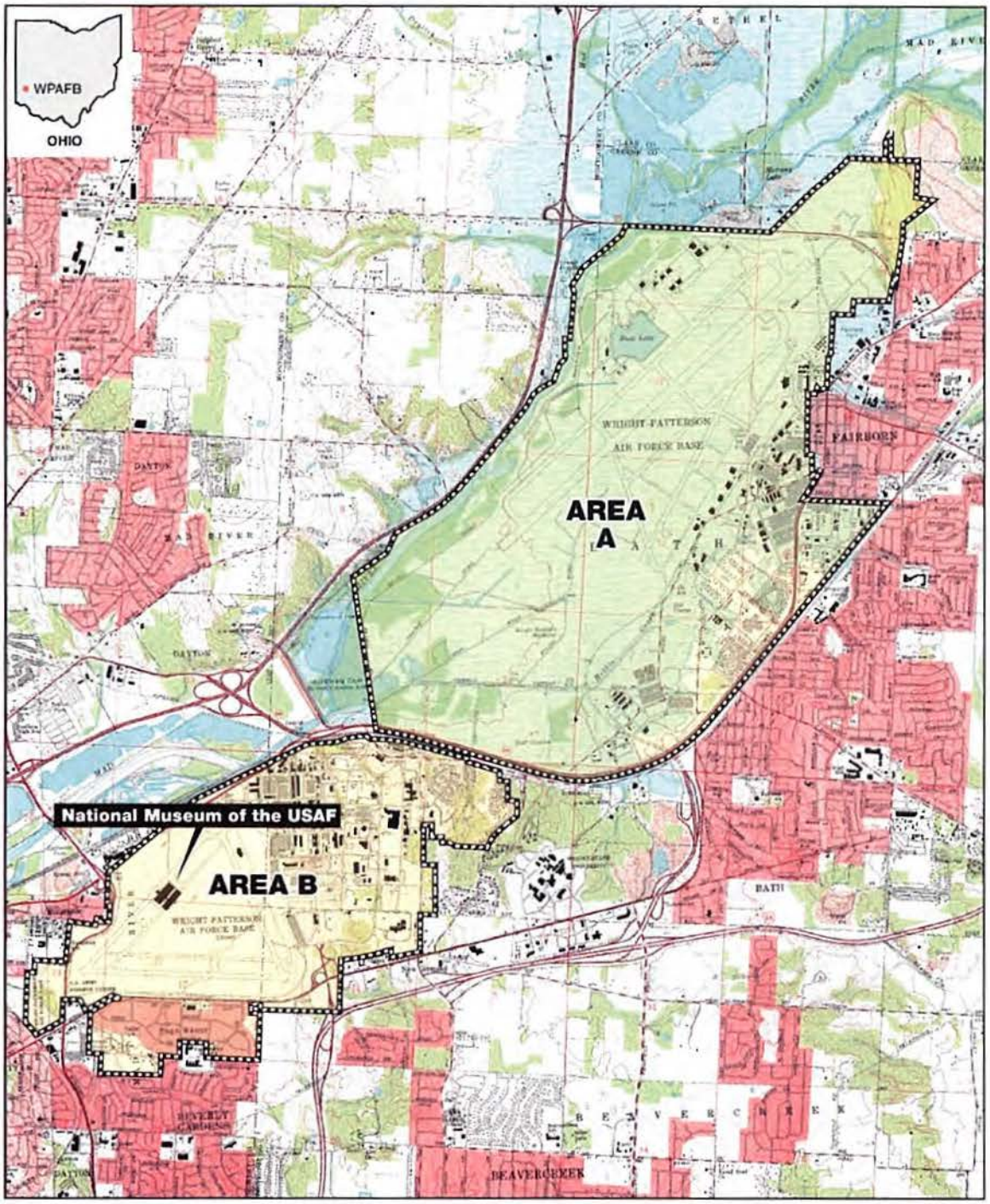
Thank you for your consideration. If you have any questions, please contact me at (937) 257-4857 or by email at Darryn.Warner@wpafb.af.mil.

Sincerely

Darryn M. Warner
Natural Resources Program Manager
Environmental Quality Section

cc: Karen Beason (88 ABW/CEAOR, WPAFB)
Cynthia A. Hassan (Shaw Environmental & Infrastructure. Inc.)

Attachments: Figure 1 – Location of WPAFB and Surrounding Area
Figure 2 – Location of Proposed NMUSAF Addition
Figure 3 – NMUSAF Addition Rendering



OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	9/13/12	--	JIS	SB	CH	s-147112.0501-9/12-w

N

0 5 1 mile

WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 1
Location of WPAFB and Surrounding Area

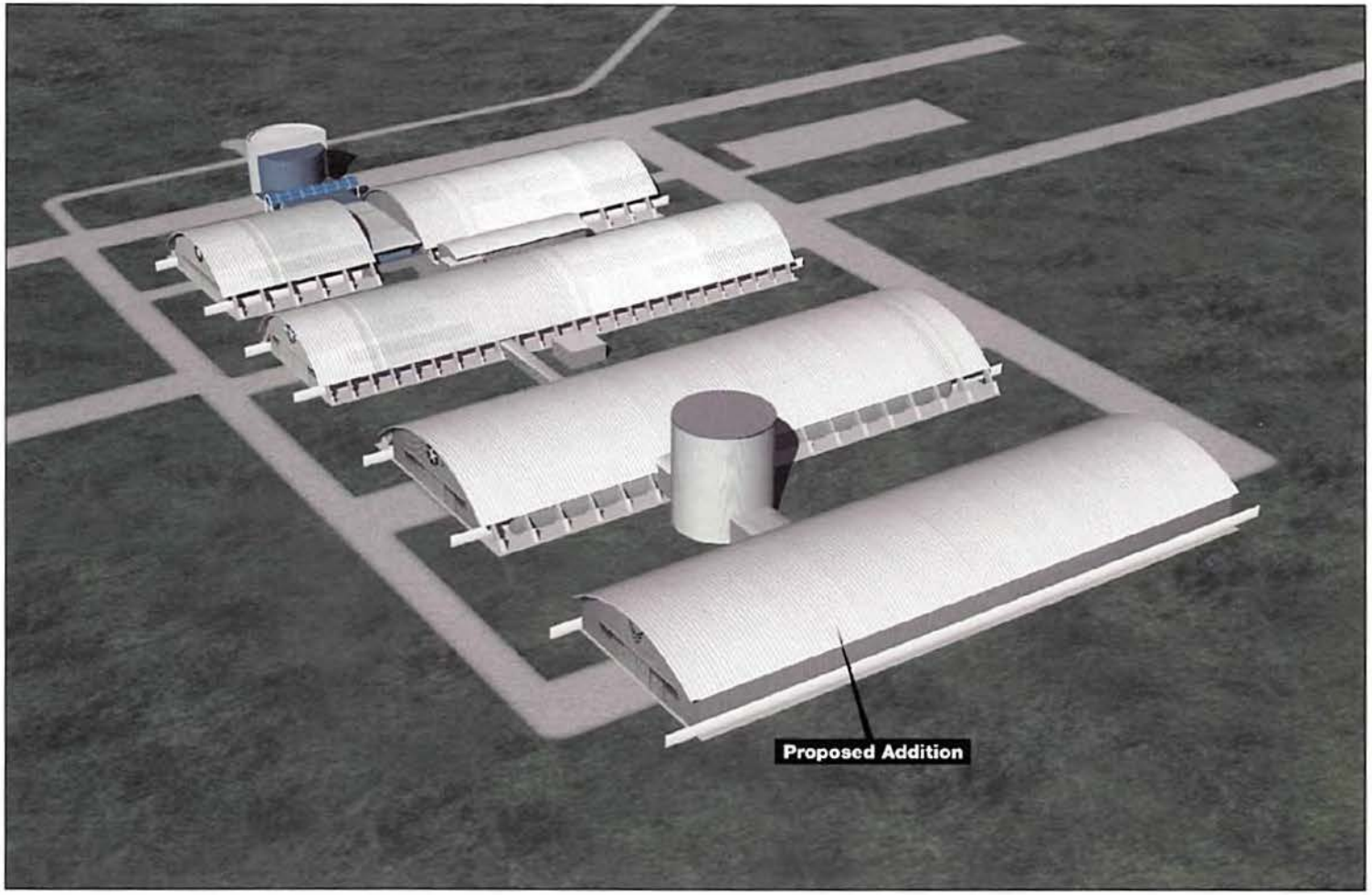
OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	9/19/12	--	JS	SB	CH	s-147112.0501-9/12-w

N

WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 2
Location of Proposed
NMUSAF Addition

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	9/19/12	--	JIS	SB	CH	s-147112.0501-9/12-w



N

WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 3
NMUSAF Addition
Rendering

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / FAX (614) 416-8994

November 6, 2012

Darryn Warner
Environmental Quality Section
88 ABW/CEANQ
1450 Littrell Road, Building 22
Wright-Patterson Air Force Base, OH 45433-5209

Reference: Consultation on the Proposed Addition to the National Museum of the United States

Dear Mr. Warner, TAILS#: 03E15000-2013-TA-0119

We have received your recent correspondence requesting information about the subject proposal. There are no Federal wilderness areas, wildlife refuges or designated critical habitat within the vicinity of the project area. We recommend that proposed activities minimize water quality impacts, including fill in streams and wetlands. Best management practices should be utilized to minimize erosion and sedimentation.

ENDANGERED SPECIES COMMENTS: Due to the project type, size, and location, we do not anticipate any impact on federally listed endangered, threatened, or candidate species, or their habitats. Should the project design change, or during the term of this action, additional information on listed or proposed species or their critical habitat become available, or if new information reveals effects of the action that were not previously considered, consultation with the Service should be initiated to assess any potential impacts.

If you have additional questions or require further assistance with your project proposal, please contact me at (614) 416-8993, ext.12. I would be happy to discuss the project in further detail with you and provide additional assistance if necessary. In addition, you can find more information on natural resources in Ohio by visiting our homepage at: http://www.fws.gov/midwest/ohio.

Sincerely,

Mary Knapp

Mary Knapp, Ph.D.
Field Supervisor

Miami Conservancy District Consultation Letters:

1. **WPAFB Request – 29Oct12**
2. **MCD Response – 02Nov12**

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 88TH AIR BASE WING (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

29 October 2012

88 ABW/CEANQ
1450 Littrell Road, Building 22
Wright-Patterson AFB OH 45433-5209

Mr. Kurt Rinehart
Miami Conservancy District
38 E. Monument Avenue
Dayton, OH 45402

Dear Mr. Rinehart:

Wright-Patterson Air Force Base (WPAFB) is preparing an Environmental Assessment (EA) to evaluate the environmental impacts of the proposed addition to the existing National Museum of the United States Air Force (NMUSAF). The NMUSAF requires an adequate facility to display its ever-growing collection of space vehicles and other historical artifacts that depict the material history of the USAF. The material is displayed to educate the general public and to train Air Force personnel in the technical and historic heritage of their device in the USAF. The proposed addition would permit consolidation and integration of items currently on display with new acquisitions.

The geographic location of the proposed project area is in Area B at WPAFB in Montgomery County, Bath Township, in Sections 17 and 18, Township 7 North, and Range 2 East (-84.11° longitude, 39.781° latitude) as shown on Figure 1.

Proposed Action

The NMUSAF (Museum) is proposing to construct an approximate 224,000 square foot (sf) addition to the existing museum. The addition would be referred to as "Hangar 4" and would be constructed approximately 195 feet south of Hangar 3 in a parallel configuration (Figure 2). Concrete tow lanes would extend from existing Hangar 3 tow lanes and would provide access to the doors on the east and west ends of Hangar 4. The addition would be similar to Hangar 3 in size and appearance. A connector with Hangar 3 would be constructed for the purpose of continuing the main circulation spine from Hangar 3 and connect into the north side of the Hangar 4 exhibit space. The connector would allow for circulation around the existing central stairs of the Hall of Missiles (Hangar 3) and into curved corridors that bring the circulation flow back into a single spine before entering into the proposed Hangar 4 exhibit space.

Hangar 4 would consist of a metal barrel vaulted exhibition hangar with a concrete foundation and floor slab, structural framing, and a prefinished metal skin. The building would include fire protection, alarms, heating ventilation and air conditioning (HVAC), power, lighting systems, a taxiway connection to the building to get aircraft and large artifacts into the building, and an enclosed walkway connection to Hangar 3, as described above. The design of Hangar 4 would be architecturally compatible with the interior and exterior of the existing Museum (Figure 3).

Hangar 4 would be designed to support exhibits on a reinforced concrete slab-on-grade to accommodate aircraft point loads. The minimum slab thickness to resist the space shuttle display is 12 inches. The minimum slab thickness to resist the C-5 display is 9 inches. The footprint would be approximately 224,000 sf and constructed of structural steel truss arches pinned at the foundation connections and rising to approximately 88 feet above the finish floor.

Under the No Action Alternative, there would be no addition constructed to the existing NMUSAF and the Museum would not have a location for the preservation and interpretation of artifacts from the space program and the air mobility mission. The Museum's collection of Presidential aircraft would not be readily available to the public and would continue to provide limited access to the public due to its current location in a secure area on WPAFB. Under the No Action Alternative, the artifacts currently displayed outside would continue to deteriorate. The continued wear on those artifacts due to exposure to the elements is contrary to the preservation of artifacts. The mission of the NMUSAF to preserve, display, and interpret the rich history of the USAF would be compromised.

Given that construction activities would be limited to areas of previous disturbance and the areas are not located in a floodplain, no impacts to floodplains are anticipated.

Thank you for your consideration. Please return your comments to me at the above address. If you have questions, please contact me at 937/257-4857 or by email at Darryn.Warner@wpafb.af.mil.

Sincerely

Darryn M. Warner

Darryn Warner
Natural Resources Program Manager
Environmental Quality Section

cc: Karen Beason (88 ABW/CEAOR, WPAFB)
Cynthia A. Hassan (Shaw Environmental & Infrastructure. Inc.)

Attachments: Figure 1 – Location of WPAFB and Surrounding Area
Figure 2 – Location of Proposed NMUSAF Addition
Figure 3 – NMUSAF Addition Rendering

MIAMI CONSERVANCY DISTRICT

November 2, 2012

Mr. Darryn Warner
88 ABW/CEANQ
1450 Littrell Road, Building 22
Wright-Patterson AFB, OH 45433-5209

Re: Huffman Retarding Basin, WPAFB, Proposed NMUSAF addition

Dear Mr. Warner:

We have reviewed the proposed changes to the National Museum of the United States Air Force (NMUSAF) in Area B at WPAFB.

As most of the proposed development is located downstream of the Huffman Dam, the proposed development will have no impact on the retarding basin.

Thank you for the opportunity to review your proposed development.

If you have any further questions please contact me at (937) 223-1278, ext. 3230 or by email at rfarrier@miamiconservancy.org.

Sincerely,

Roxanne H. Farrier
Property Administrator

cc: Kurt Rinehart

Ohio Historic Preservation Office Consultation Letters:

1. **WPAFB Request – 02Nov12**
2. **OHPO Response – 21Dec12**

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 88TH AIR BASE WING
WRIGHT-PATTERSON AIR FORCE BASE OHIO

2 November 2012

Paul F. Woodruff, CRM
88 ABW/CEAN
1450 Littrell Road
Wright-Patterson AFB OH 45433-5209

Mr. Mark Epstein
Department Head, Resource Protection & Review
Ohio Historic Preservation Office
800 East 17th Avenue
Columbus OH 43211-2497

Dear Mr. Epstein

Wright-Patterson Air Force Base (WPAFB) is proposing to undertake a project to construct a new hangar for the National Museum of the United States Air Force (NMUSAF). This new facility would be constructed on the grounds of NMUSAF attached to Facility 20494 which has not been formally assessed for its historic significance. WPAFB does however consider this facility to be potentially eligible for listing on the National Register of Historic Places for Cold War significance. The museum grounds and this new proposed facility would be situated within the triangular runway area of the Wright Field Historic District (WFHD). The WFHD is eligible for listing on the National Register of Historic Places. It is our opinion that the proposed undertaking will have no adverse effect on the historic properties. In accordance with 36 CFR 800.11(e), we are submitting the following documentation.

Description of the undertaking. WPAFB proposes to construct a new 128,946 square meter metal barrel vaulted exhibition hangar which will be architecturally compatible with the existing museum hangars. This hangar would be connected to the existing cylindrical missile gallery which is attached to the southeast side of existing Facility 20494 (see attachment 1). Hangar 4 would be located approximately 195 ft south of Hangar 3 in a parallel configuration. Concrete tow lanes would extend from existing Hangar 3 tow lanes and would provide access to the doors on the east and west ends of Hangar 4. The addition would be similar to Hangar 3 in size and appearance. A connector with Hangar 3 would be constructed for the purpose of continuing the main circulation spine from Hangar 3 and connect into the north side of the Hangar 4 exhibit space. The connector would allow for circulation around the existing central stairs of the Hall of Missiles (Hangar 3) and into curved corridors that bring the circulation flow back into a single spine before entering into the proposed Hangar 4 exhibit space. Hangar 4 would consist of a metal barrel vaulted exhibition hangar with a concrete foundation and floor slab, structural framing, and a prefinished metal skin. The building would include fire protection, alarms, heating ventilation and air conditioning (HVAC), power, lighting systems, a taxiway connection to the building to get aircraft and large artifacts into the building, and an enclosed walkway connection to Hangar 3, as described above. The design of Hangar 4 would be architecturally

compatible with the interior and exterior of the existing museum. Hangar 4 would be designed to support exhibits on a thick concrete slab on grade to accommodate aircraft point loads and suspended smaller aircraft from the primary arch trusses. The footprint would be approximately 321 ft wide by 830 ft long and constructed of structural steel truss arches pinned at the foundation connection and rising to approximately 88 ft above the finish floor.

Description of steps taken to identify historic properties. WPAFB has assessed all buildings on the installation that are 50 years old or older, and has assessed buildings for exceptional significance relating to the Cold War. NMUSAF Facilities 20487 and 20489 are eligible for listing on the National Register of Historic Places for Cold War significance. Facility 20494, although not formally assessed, is considered by WPAFB to be eligible for Cold War significance also. Wright Field as delineated in Attachment 2 is eligible for listing on the National Register of Historic Places as a historic district. The Ohio Historic Preservation Office concurred in this determinations on January 25, 1999. Attachment 2 indicates the proposed new museum hangar facility, its location within the triangular runway feature of the WFHD, and contains the Ohio Historic Inventory forms for Facilities 20487 and 20489.

Description of the affected properties. The United States Air Force Museum is today recognized as one of the finest and oldest museums of military aviation. The museum has its roots at Wright-Patterson, having originated in 1923 as a small display of World War I aircraft and equipment at McCook Field, which is now part of Wright-Patterson's Area C. With the establishment of Wright Field in 1927, the museum was relocated to the installation, and occupied 1,500 square feet of space in one of the laboratory buildings of the Materiel Division. In 1935, the museum was moved into the Technical Data Building (Area B, Building 12). The space in the Technical Data Building was especially designed to house and display artifacts, and was funded by the Works Progress Administration (WPA). The collection, which numbered approximately 2,000 artifacts, was placed in storage in 1940, and the old museum space in the Technical Data Building was put to wartime uses. At the end of the war, the museum was re-activated with the mission of collecting additional items to be displayed when the museum was re-opened to the public. In April 1954, the museum did re-open to the public in Building 89, a temporary World War II structure. By the 1960s, this building was inadequate. The Air Force Foundation was established as a non-profit organization in 1960, and by the end of the 1960s over $6 million had been raised for the construction of a new facility for the museum (Building 489). The building was completed in August of 1971, and was dedicated in September of that year by President Richard Nixon. The building was located on a 400-acre site in Area B, and was paid for entirely through public donations. A $1 million visitor center was added to the museum in 1976 as a gift to the Air Force. In addition to its displays of historic aircraft, the museum houses an art gallery, Medal of Honor gallery, and displays of historic artifacts such as uniforms, diaries, armament, and models. Since 1954, the attendance of the museum has increased to over 1 million visitors. In 1988, Building 487, also know as the Modern Flight Gallery, was built as further exhibition space for historic aircraft. The building houses displays of aircraft & other artifacts related to a number of Cold War events & technologies, including the Korean War, Vietnam War, & Experimental Aircraft. The museum is also actively involved with the support of other aviation museums around the country, & has over 800 aircraft on loan to other museums.

Facility 20487 is a metal arched hangar with exposed steel trusses and columns. The interior of the hangar is open and has exposed structural systems. The facility houses modern airplanes for the USAF Museum and is connected to Facility 20489 through a 1-story corridor.

Facility 20489 is a three part building with two segmental arched hangars to either side of a two-story office section. The hangars were constructed with steel trusses and columns and a standing seam metal roof covering. The interior of the hangars house museum space for early airplanes. The two-story middle section contains offices, gathering spaces, and rotating exhibits. Offices, gift shop, and cafeteria were added in a 1976 addition. An addition was added to the facility is 1991-1992. The addition contains an entry foyer and an I-max theatre. This building is connected to Facility 20487 through a 1-story corridor on the south.

Facility 20494 is a 234,468 square foot metal arched hangar with exposed steel trusses and columns and basically follows closely the construction techniques and design of the previous museum addition Facility 20487. The interior of the hangar is open and has exposed structural systems and was constructed in 2004 . The facility currently houses the Cold War Gallery exhibits of the museum.

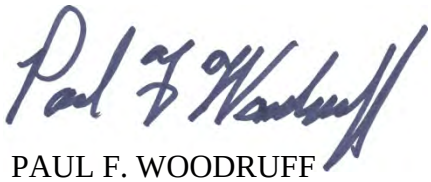
The Wright Field Historic District is eligible for listing on the National Register of Historic Places for exceptional significance relating to the development of aviation. For two decades Wright Field was synonymous with the development of American military aviation. From 1927 to 1947, the field served as the centerpiece for test-flying and improving the performance of virtually all military aircraft designs for the U.S. Army Air Corps and U.S. Army Air Forces—the precursors to today's United States Air Force—giving it a unique position among other government laboratories as the army's major center for aircraft research and development in the interwar and World War II years. The district is located on approximately 1,000 acres and contains 69 contributing resources. Its large-scale test facilities, support buildings, and runways illustrate the place where the army's aeronautical technology developed and flourished, ensuring America's air superiority in World War II.

Description of the undertaking's effects on historic properties. It is our opinion that the proposed construction of this fourth hangar for the NMUSAF would not have an adverse effect on the historic properties. Five buildings of the NMUSAF already exist within the triangular runway area of Wright Field including two which are eligible for the National Register for Cold War significance and a third Facility 20494 which is potentially eligible. The design and construction of the new proposed building would be in keeping with the existing museum buildings and the purpose of the new facility would be in keeping with the mission and use of the existing mueum facilities. The connection of the new building to the existing complex would not adversely affect the historic buildings. Additionally, these buildings do not obscure the views from the historic flight line. It is the effects to the view shed from historic Wright Field and the surrounding area that would be of most concern. The triangular runway area is truly a vast area and the intrusion into the area of the existing buildings and that of a new fourth hangar do not significantly impact the feel of the space. The observer would still be able to see the triangular runways from many positions on and around the base, and still have a feel for the large expanse of open terrain that represents the old airfield. And what better place to present the history of the United Stated Air Force and its legacy than the runway system of historic Wright Field. A collection of photographs of existing views is included as attachment 3. There would be no

impact to Wright Field Historic District and Facilities 20001 and 20009 when the presidential aircraft collection is relocated from these facilities to the proposed new hangar, since the museum will continue to occupy and utilize the two facilities. There are no significant archaeological resources within the triangular runway area of Wright Field that could be affected by construction of this facility (see Attachment 4). The continued thriving visitation to the museum and the ongoing improvements to the preservation efforts of aviation heritage at Wright Field, only help to enhance the museum's connections to the history of WPAFB and its historic districts. Therefore, it is our opinion that, in accordance with 36 CFR 800.5(b), the proposed undertaking would have no adverse effect on the historic properties.

Please review the information we have provided and let us know whether you concur with the no adverse effect determination. Should you have questions, feel free to contact me at (937) 257-1374, or via email at paul.woodruff@wpafb.af.mil.

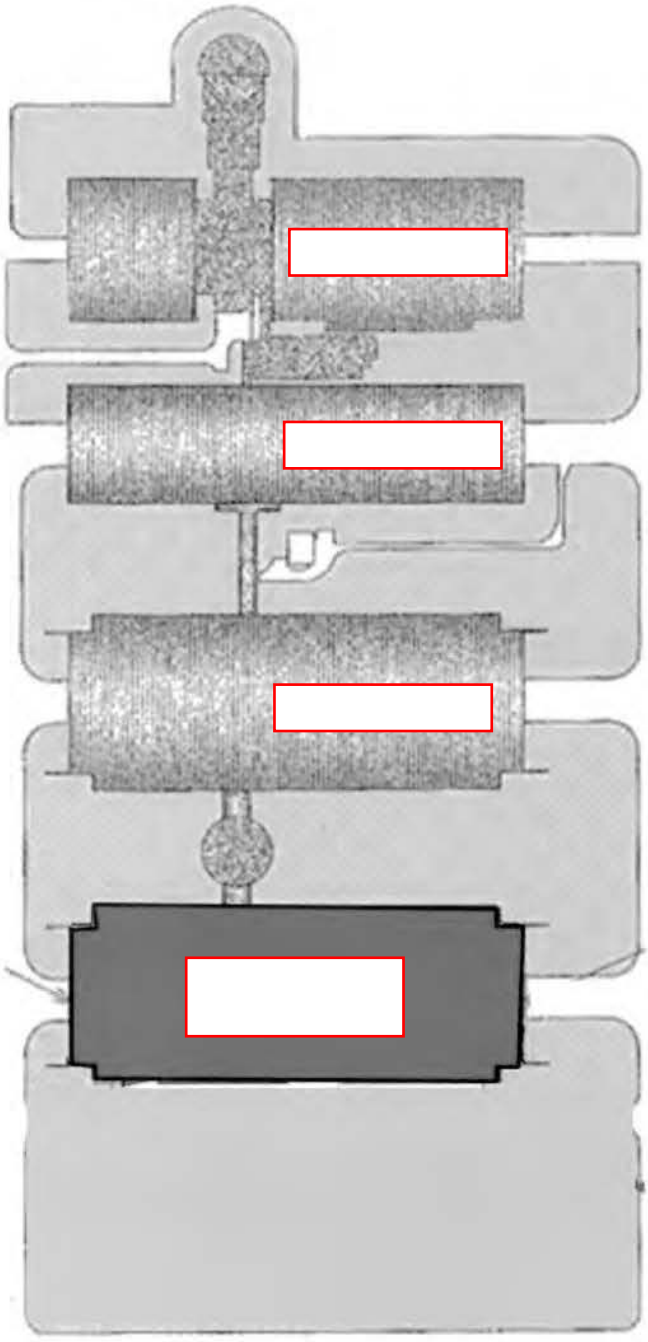
Sincerely



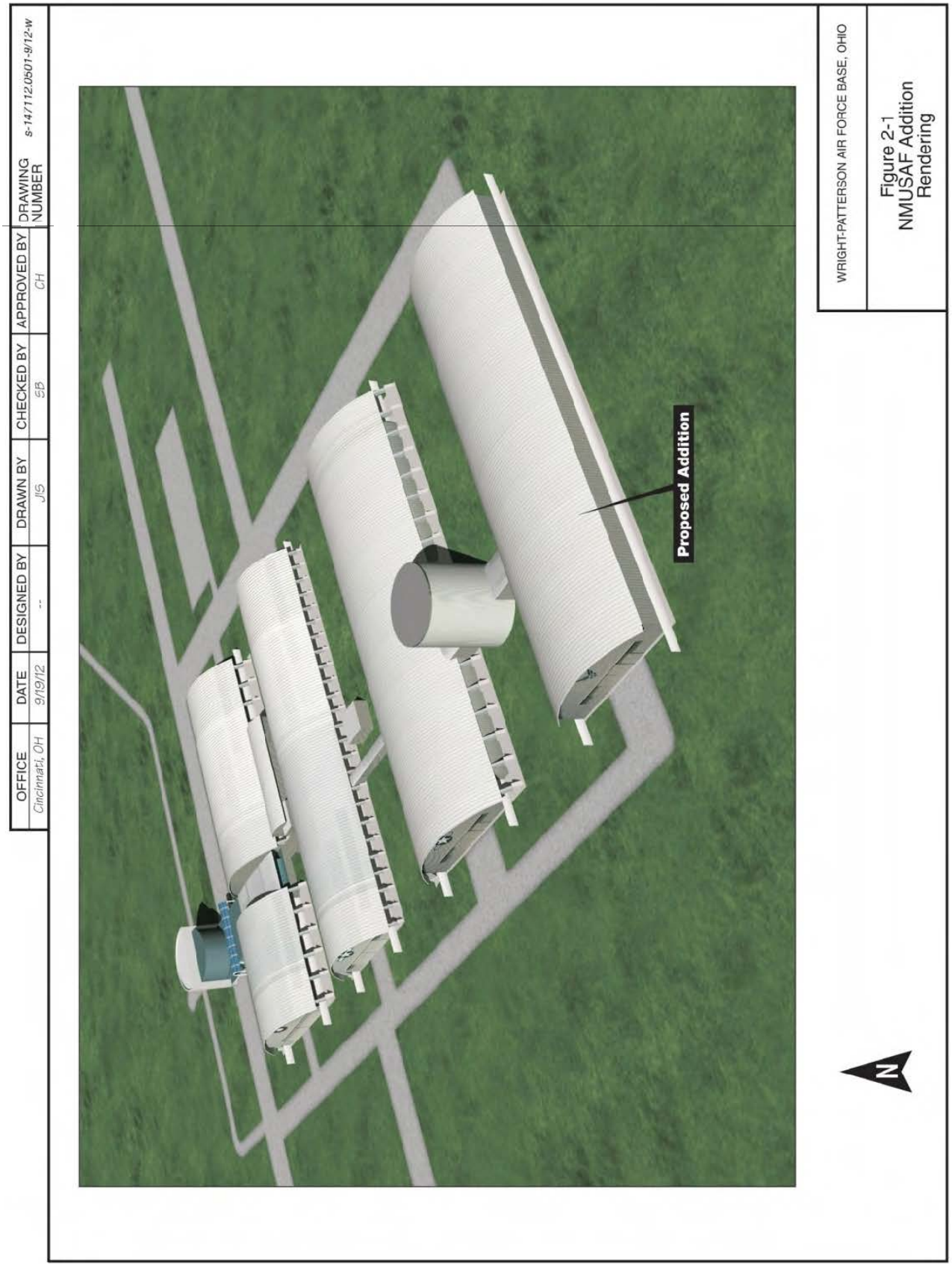
PAUL F. WOODRUFF
Cultural Resources Manager
Environmental Branch

Attachments:
1. Plans and Map
2. Wright Field Historic District Maps and Facility 20487 & 20489 OHI Forms
3. Photos
4. WPAFB Archaeological Mapping (ICRMP 2011)

1. COMPONENT AIR FORCE	FY 2012 MILITARY CONSTRUCTION PROJECT DATA COMPUTER GENERATED	2. DATE
3. INSTALLATION AND LOCATION WRIGHT-PATTERSON AFB OH		
ADD TO THE NATIONAL MUSEUM OF THE AIR FORCE		5. PROJECT NUMBER ZHTV055002



ZHTV055002
Add to Air Force
Museum


OFFICE
Cincinnati, OH
DATE
9/19/12
DESIGNED BY
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DRAWN BY
JTS
CHECKED BY
SB
APPROVED BY
CH
DRAWING NUMBER
s-147112.0501-9/12-w
Proposed Addition
N
WRIGHT-PATTERSON AIR FORCE BASE, OHIO
Figure 2-1
NMUSAF Addition
Rendering

1

Figures, Photographs, ICRMP Archaeology Mapping, and Ohio Historic Inventory Forms of the 02Nov12 letter are available upon request*, contact:

Asset Management Division
Environmental Quality Section
88 ABW/CEANQ
Cultural Resources Manager
Wright-Patterson AFB
(937) 257-1374

***Following confidentiality requirements under Air Force Instruction 32-7065 (02Nov09; Section 4.4) and pertinent authorities protecting cultural resources.**

December 21, 2012

Paul F. Woodruff
Cultural Resources Manager
Environmental Branch
88 ABW / CEANQ
1450 Littrell Road
Wright-Patterson Air Force Base, Ohio 45433-5209

Dear Mr. Woodruff:

Re: Construction of a new hangar at the National Museum of the United States Air Force, Area B, Wright-Patterson Air Force Base, Ohio

This is in response to correspondence dated November 2, 2012, (received on November 8, 2012) regarding the above referenced project. Our comments are made pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated regulations at 36 CFR Part 800.

Wright-Patterson Air Force Base (WPAFB) proposes to construct a new hangar for the National Museum of the United States Air Force within Area B of the base. The new structure will be located approximately 195 feet south of Facility 20494 and attach to its cylindrical missile gallery via a connector intended to facilitate circulation of museum visitors. The proposed hangar will be similar in size and appearance to Facility 20494.

The new structure will be the fourth hangar constructed along the west side of the triangular runway within the Wright Field Historic District, which is eligible for listing in the National Register of Historic Places. Facility 20487 (built in 1988), Facility 20489 (built in 1971), and Facility 20494 (built in 2004) were constructed to house the NMUSAF. The Air Force recommended that Facility 20487 and Facility 20489 are eligible for listing in the National Register of Historic Places in its "Cultural Resources Management Plan for Wright-Patterson Air Force Base, Dayton, Ohio" prepared by IT Corporation and Hardlines: Design & Delineation in December 1998. The Ohio Historic Preservation Office concurred with this recommendation in a January 25, 1999, letter to WPAFB regarding the Cultural Resources Management Plan.

Your November 2, 2012, correspondence states that Facility 20487 and Facility 20489 "are eligible for listing on the National Register of Historic Places for Cold War significance", and adds that, while the Air Force has not formally assessed the historic significance of Facility 20494, WPAFB considers it "to be eligible for Cold War significance also." I wish to clarify that OHPO's concurrence regarding the National Register eligibility of these facilities is based on analysis presented in the "Final Updated Building Evaluations for Historic Significance", prepared by IT Corporation and Hardlines: Design & Delineation, dated October 13, 1998. That report states that Facility 20489 is eligible for the National Register of Historic Places "as an excellent example of...American modernist architecture of the 1970s, as one of the major works of internationally recognized architects Roche and Dinkeloo, and as home of the U.S. Air Force Museum." OHPO places particular emphasis on the first two factors. Note that the report does not assign a Cold War association to Facility 20487 and Facility 20489, which seems appropriate considering that they were built for the purpose of housing a museum as opposed to promoting military readiness or research. The report emphasizes the significance of their design, function, and association with prominent modern architects.

Clearly, the presence of another hangar will be "in keeping with the existing museum buildings and the purpose of the new facility (will) be in keeping with the mission and use of the existing museum facilities," as you state in your correspondence. We also share your opinion that the new hangar will not obscure views from the historic flight line or compromise the view shed from within the Wright Field Historic District, despite being a fairly significant addition to the landscape. Therefore, we concur with your finding that this project will have no adverse effect on historic properties.

No further coordination with this office is necessary unless there is a change in the project. If additional historic properties are discovered or unanticipated effects on historic properties found during project implementation, this office must be notified pursuant to 36 CFR Section 800.13(b)(3).

If you have any questions, please contact me by phone at (614) 298-2000 or by email at jcook@ohiohistory.org. Thank you for your cooperation.

Sincerely,

Justin M Cook

Justin M. Cook, History Reviews Manager
Resource Protection and Review

OHPO Serial # 1046638

Appendix C

Clean Air Act
General Conformity Analysis

EXECUTIVE SUMMARY

Agencies: U.S. Air Force (USAF), Wright-Patterson AFB, Ohio

Designation: Clean Air Act General Conformity Analysis

Affected Location: Wright-Patterson AFB, Ohio

Proposed Action: Addition to the National Museum of the United States Air Force

Abstract: The National Museum of the United States Air Force (NMUSAF) requires an adequate facility to display its ever-growing collection of space vehicles and other historical artifacts that depict the material history of the USAF. The material is displayed to educate the general public and to train Air Force personnel in the technical and historic heritage of their service in the USAF. To adequately display these artifacts, the USAF has proposed a 224,000 square foot addition to the existing museum center that would permit consolidation and integration of items currently on display with new acquisitions. As part of the proposed action, a fourth hangar, Hangar 4, would be constructed adjacent to the existing museum center.

The Proposed Action at Wright-Patterson AFB would be located in the Dayton-Springfield Metropolitan Area, which is currently designated as a "maintenance" area for attainment with the National Ambient Air Quality Standard (NAAQS) for ozone (O_3; both 1-hour and 8-hour standards) (OEPA 2010a-c). In addition, the area is classified for very fine particulate matter ($PM_{2.5}$) as attainment with the 24-hour standard and nonattainment for the annual standard (OEPA 2010a-c).

The USEPA recently proposed new NAAQS for several criteria pollutants including O_3 (March 2008), lead (Pb; November 2008), nitrogen dioxide (NO_2; February 2010), and sulfur dioxide (SO_2; June 2010) (USEPA 2008a, b); (USEPA 2010a, c). The USEPA recently designated the new NO2 NAAQS to unclassifiable/attainment effective February 29, 2012 (USEPA 2012). The USEPA and Ohio EPA have not yet completed effective designations for the remaining pollutants as of the date of this conformity applicability analysis (OEPA 2010a-c). Redesignation of the Dayton-Springfield Metropolitan Area as nonattainment for any of these standards during the execution of the Proposed Actions has no statutory impact on this Conformity Analysis because Section 6 of 176.c of the CAAA states that Conformity does not take effect until one year after the effective date of a nonattainment designation (40 CFR 93.153(k)).

Based upon the conformity applicability criteria requirements, and the current attainment status of the areas affected by the NMUSAF operations at Wright-Patterson AFB, this conformity analysis focuses upon potential air emissions of O_3 precursors, [i.e., volatile organic compounds (VOCs) and nitrogen oxides (NO_x)], $PM_{2.5}$ direct emissions, and $PM_{2.5}$ precursors (i.e. SO_2 and NO_x). This analysis does not address the pollutants for which affected areas are in "attainment" – sulfur oxides (SO_x), nitrogen dioxide (NO_2), carbon monoxide (CO), fine particulate matter (PM_{10}), and lead (Pb).

Emissions of VOC, NO_x, $PM_{2.5}$, and SO_2 in the vicinity of Wright-Patterson AFB (Metropolitan Dayton Intrastate Air Quality Control Region [AQCR]) are

all not expected to interfere with the Ohio SIP maintenance plans as a result of the Proposed Action.

The conformity analysis completed for this project concluded that the Proposed Action at Wright-Patterson AFB will not be required to conduct a conformity determination under the requirements of the Federal Conformity Rule. Emissions estimates attached to this analysis predict that emission levels of all criteria pollutants for any calendar year of the proposed project would fall below the 100 tons per year *de minimis* thresholds of VOC, NO_x, $PM_{2.5}$, and SO_2 for triggering a formal Conformity determination, as defined in 40 CFR 93.153(b). The General Conformity Regional Significance threshold no longer applies because it was deleted in the revised Federal General Conformity rules promulgated on April 4, 2010 (USEPA 2010b).

Conformity Analysis:

After careful and thorough consideration of the facts contained herein, and following consideration of the views of those agencies having jurisdiction by law or special expertise with respect to air quality impacts and the SIP, the project proponent finds that the proposed Federal actions are consistent with the objectives as set forth in Section 176(c) of the Clean Air Act (CAA), as amended, and its implementing regulation, 40 CFR Part 93, Subpart B, Determining Conformity of General Federal Actions to State and Local Implementation Plans, and said actions conform to the applicable SIP in accordance with the law.

The conformity analysis is based upon the total direct and indirect emissions associated with the proposed addition to the NMUSAF at Wright-Patterson AFB, Ohio. Future activity levels in operations associated with the NMUSAF at Wright-Patterson AFB addressed by this action may differ from those analyzed in this conformity analysis. If the Proposed Action is changed so that there would be a change in the total direct and indirect emissions reported in this analysis, a new conformity analysis must be performed.

TABLE OF CONTENTS

LIST OF TABLES

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C.1. Introduction

The Clean Air Act Amendments (CAAA) of 1990 require Federal agencies to ensure that their actions conform to the applicable State Implementation Plan (SIP). The SIP is a U.S. Environmental Protection Agency (USEPA)-approved plan developed by state or local agencies. It provides for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS). The SIP includes emission limitations, rules, schedules, and specific control measures to attain and maintain the NAAQS. Conformity to a SIP, as defined in the Clean Air Act (CAA), means conforming to the SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards.

As a Federal agency and proponent of a "Federal Action," the U.S. Air Force (USAF) must complete a conformity analysis to determine whether the addition of Hangar 4 at the NMUSAF and associated regulated pollutant emissions at Wright-Patterson AFB would conform to the Ohio SIP. The Proposed Action consists of two parts: construction of a new Hangar 4 to be connected to the existing Hangar 3; and future activities with ongoing operations at the NMUSAF. The No Action Alternative was not evaluated in this determination because no changes to baseline air emissions would occur. Under the Proposed Action for future activities with ongoing operations, personnel authorizations would potentially increase by four for the full-time museum staff and while up to 150 additional volunteers are anticipated. All elements of the Proposed Action could affect areas covered by the SIP, so a conformity analysis is required.

C.1.1 Background

The CAA and CAAA were passed by Congress and corresponding rules were promulgated by USEPA because it has been determined that certain pollutants have the potential to cause an adverse effect on public health and the environment when certain concentrations are exceeded in ambient air. In order to control and regulate these "criteria pollutants" and better maintain healthful air, NAAQS were established for seven criteria pollutants. These pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), sulfur oxides (SO_x), and lead (Pb). Ozone is not typically emitted directly from emission sources, but rather is formed in the atmosphere by photochemical reactions involving sunlight and other emitted pollutants, or "ozone precursors." These ozone precursors consist primarily of nitrogen oxides (NO_x) and volatile organic compounds (VOCs), which are emitted directly from a wide range of stationary and mobile sources. Therefore, O_3 concentrations in the atmosphere are controlled through limiting the emissions of NO_x and VOCs.

$PM_{2.5}$ can be emitted from emission sources directly as very fine dust and/or liquid mist or formed secondarily in the atmosphere as condensable particulate matter typically forming nitrate and sulfate compounds. Precursors of condensable $PM_{2.5}$ can include SO_2, NO_x, VOC, and ammonia. Secondary (indirect) emissions vary by region depending upon the predominant emission sources located there. The States in developing SIP revisions must determine which precursors are considered significant for $PM_{2.5}$ formation. In the draft Ohio SIP revisions proposed on April 24, 2009, Ohio EPA included in the definition of "$PM_{2.5}$ precursor" that $PM_{2.5}$ precursors include sulfur dioxide and nitrogen oxides in OAC Rule 3745-31-01(UUUU) draft 04/24/2009.

Air quality conformity provisions first appeared in the CAA of 1977. These provisions stated that no Federal agency could engage in; support in any way; provide financial assistance for; license, permit, or approve any activity that did not conform to a SIP after approval and promulgation. Section 176(c) (42 United States Code 7506c) of the CAA, as amended in 1990, further explained conformity to an implementation plan as meaning conformity to the plan's purpose of eliminating or reducing the severity of violations of the NAAQS, and achieving timely attainment of these standards. In November 1993, USEPA promulgated regulations and requirements that clarify the applicability, procedures, and analyses necessary to ensure that Federal facilities comply with the CAA.

In establishing the Final General Conformity Rule, USEPA requires Federal agencies to evaluate a proposed Federal action and ensure that it does not:

1. Cause a new violation of a NAAQS
2. Contribute to an increase in the frequency or severity of violations of NAAQS
3. Delay the timely attainment of any NAAQS, interim progress milestones, or other milestones toward achieving compliance with the NAAQS

The General Conformity Rule requires that Federal agencies consider total direct and indirect emissions of criteria pollutants. Conformity must be shown for those pollutants (or precursors) emitted in areas designated as nonattainment for those pollutants as well as pollutants for which an area has been redesignated from nonattainment to attainment (i.e., a maintenance area).

The Conformity Rule requires that Federal agencies do a conformity applicability analysis to determine whether a formal conformity determination is required. The primary criteria used in an applicability analysis are the *de minimis* thresholds. The total direct and indirect emissions associated with a proposed action are compared to the *de minimis* threshold levels promulgated in 40 Code of Federal Regulations (CFR), 93.153(b). **Table C-1** below presents the applicable *de minimis* thresholds under the General Conformity Rule.

Table C-1. General Conformity Rule *de minimis* Emission Thresholds

Pollutant	Status	Classification	*de minimis* Limit (tpy)
Ozone (measured as NO_x or VOCs)	Nonattainment	Extreme	10
		Severe	25
		Serious	50
		Moderate/marginal (inside ozone transport region)	50 (VOCs)/100 (NO_x)
		All others	100
	Maintenance	Inside ozone transport region	50 (VOCs)/100 (NO_x)
		Outside ozone transport region	100
Carbon Monoxide (CO)	Nonattainment/ maintenance	All	100
Particulate Matter (PM_{10})	Nonattainment/ maintenance	Serious	70
		Moderate	100
		Not applicable	100
Particulate Matter ($PM_{2.5}$)	Nonattainment/ maintenance	Direct	100
		Sulfur Dioxide	100
		NOx (unless not a significant precursor)	100
		VOC or Ammonia (if a significant precursor)	100
Sulfur Dioxide (SO_2)	Nonattainment/ maintenance	Not applicable	100
Nitrogen Oxides (NO_2)	Nonattainment/ maintenance	Not applicable	100
Lead (PB)	Nonattainment/ maintenance	All	25

Source: 40 CFR 93.153
tpy: tons per year

When applicable, another required analysis is a comparison of the Federal action's emissions to any existing SIP emission budgets that have been established specifically for the Federal facility or the affected region. If the action would cause an increase in emissions such that the established SIP emissions budgets would be exceeded, a formal conformity determination and other applicable rule requirements would apply. In the case of Wright-Patterson AFB, there is no facility-specific emissions budget in the Ohio SIP.

C.1.2 Purpose

The purpose of this general conformity analysis is to document the USAF's compliance with CAA requirements in accordance with 40 CFR 93 subpart B and Ohio Administrative Code, Rule 3745-102. This conformity analysis will analyze the air quality impact of emissions of nonattainment pollutants (i.e., NO_x, VOC, $PM_{2.5}$, and SO_2) resulting from the proposed Federal action in order to determine whether the Proposed Action will be subject to these Federal and state conformity rules.

C.1.3 Document Organization

The remainder of Section C.1 presents the purpose and background for the document, describes the proposed project at Wright-Patterson AFB and summarizes the existing air quality conditions in the region. Section C.2 of this analysis outlines the regulatory requirements of the General Conformity Rule and their relationships to this Conformity Analysis.

Section C.3 details the applicability of the conformity rule to the proposed NMUSAF addition project at Wright-Patterson AFB. Section C.4 provides the conformity analysis results for the Proposed Action. Finally, the emissions estimations attached to this analysis detail the calculation methodologies and results used for this conformity analysis.

C.1.4 Existing Air Quality

Air Basins/Air Quality Control Regions

Wright-Patterson AFB is located in Greene and Montgomery counties, Ohio, which are in the Metropolitan Dayton Intrastate Air Quality Control Region (AQCR). The Metropolitan Dayton AQCR consists of the counties of Clark, Greene, Miami, Montgomery, Darke, and Preble. The NMUSAF is located on the Montgomery County portion of the base.

Air quality resources in the Metropolitan Dayton AQCR are managed by the Ohio Environmental Protection Agency (OEPA), Division of Air Pollution Control (DAPC). Local permitting of stationary air emissions sources is delegated to the Regional Air Pollution Control Agency (RAPCA) in Dayton. Ambient air quality for the Metropolitan Dayton Intrastate AQCR was formerly classified as a maintenance area for the 1-hour O_3 and 8-hour O_3 (1997) standards and is classified as a nonattainment area for the annual $PM_{2.5}$ NAAQS (USEPA 2005); (USEPA 2007). For the annual $PM_{2.5}$ NAAQS, OEPA has proposed redesignation to "attainment" (maintenance area) (March 2011), however, that action has no impact on this conformity analysis (OEPA 2011a). Except as noted in the following paragraph, the Metropolitan Dayton Intrastate AQCR is designated as an

unclassifiable/attainment area for all other criteria pollutants, which include SO_x, PM_{10}, CO, NO_2, and Pb.

Ambient Air Quality Attainment Designations for Affected Air Quality Control Region

The USEPA recently proposed new NAAQS standards for several criteria pollutants including O_3 (March 2008), Pb (November 2008), NO_2 (February 2010), and SO_2 (June 2010) (USEPA 2008a, b); (USEPA 2010a, c). The USEPA formally designated the area to unclassifiable/attainment for the new NO_2 NAAQS effective February 29, 2012 (USEPA 2012). The USEPA and Ohio EPA have yet to complete effective area designations for the remaining pollutants as of the date of this conformity applicability analysis (OEPA 2010a, b); (OEPA 2010). For the new 1-hr SO_2 NAAQS, the OEPA published a draft report in April, 2011 recommending that Montgomery County be designated as "unclassified" (OEPA 2011b). Redesignation of the Dayton-Springfield Metropolitan Area as nonattainment for any of these standards during the execution of the Proposed Action has no statutory impact on this Conformity Analysis. Furthermore, the recently revised General Conformity Rule included new *de minimis* thresholds for $PM_{2.5}$ and did not change the other pollutant thresholds (USEPA 2010b). This is because the General Conformity *de minimis* thresholds correspond to the CAAA Title V Major Stationary Source emissions thresholds for each nonattainment classification. The new Major Stationary Source emission threshold for "basic" nonattainment with the 8-hour O_3 standard is 100 tons per year. Therefore, assuming that the General Conformity Rule follows this precedent when updated, the General Conformity *de minimis* thresholds for NO_x, VOC, $PM_{2.5}$, and SO_2 in the Dayton-Springfield Metropolitan Area would be expected to remain at 100 tpy for the next several years.

Nonattainment Pollutants

Ozone is a secondary pollutant formed in the atmosphere by photochemical reactions of previously emitted pollutants (mainly VOCs and NO_x) and sunlight. A brown odorless gas, O_3 can cause irritation of the respiratory tract in humans and animals, and can damage vegetation. The maximum effect of the precursor emissions on O_3 formation may be many miles from the source because O_3 is a by-product of a photochemical reaction.

$PM_{2.5}$ can be emitted from emission sources directly as very fine dust and/or liquid mist or formed secondarily in the atmosphere as condensable particulate matter typically forming nitrate and sulfate compounds. Precursors of condensable $PM_{2.5}$ can include SO_2, NO_x, VOC, and ammonia. Secondary (indirect) emissions vary by region depending upon the predominant emission sources located there. Health studies have shown a significant association between exposure to fine particles

and premature death from heart and lung disease. Fine particles can aggravate heart and lung diseases and have been linked to effects such as: cardiovascular symptoms; cardiac arrhythmias; heart attacks; respiratory symptoms; asthma attacks; and bronchitis. These effects can result in increased hospital admissions, emergency room visits, absences from school or work, and restricted activity days.

State Implementation Plan

In accordance with Federal and state CAA requirements, the OEPA and all agencies responsible for CAA implementation in nonattainment areas must develop and implement a plan to reduce and maintain regulated air pollution levels that are less than the NAAQS. On April 24, 2009, Ohio EPA completed draft amendments to several rules in OAC Rule 3745-31 and OAC Rule 3745-17-08 rules related to Federal changes affecting the implementation of $PM_{2.5}$. On December 9, 2009, Ohio EPA drafted new rules and amended several rules in OAC Rule 3745-21, OAC Rule 3745-72, and OAC Rule 3745-110 intended to assist in achieving and maintaining the NAAQS for O_3 through the control of O_3 precursors. A portion of these draft rules have become SIP approved by the USEPA as of the completion of this applicability determination, though others are still under review. In accordance with ORC 119.032, Ohio EPA initiated the 5-year review of OAC Rule 3745-102 in August 2012. Ohio EPA anticipates making revisions to this rule to fully align it with the federal rules of 40 CFR Part 93 (OEPA 2012). The current list of effective rules is maintained by Ohio EPA on its air pollution control website at http://epa.ohio.gov/dapc/DAPCrules.aspx. Ohio EPA additionally maintains a current listing of the Dayton-Springfield Metropolitan Area attainment status on its website at http://www.epa.ohio.gov/dapc/general/naaqs.aspx.

C.2. GENERAL CONFORMITY DETERMINATION REQUIREMENTS

C.2.1 Regulatory Background

USEPA has promulgated rules that establish the conformity determination criteria and procedures for Federal actions, pursuant to Section 176(c) of the CAA. The General Conformity Rule (40 CFR Part 93, Subpart B) defines the "general" conformity criteria and procedures for Federal agencies that propose to implement non-transportation projects. The Ohio Administrative Code Rule 3745-102 contains the General Conformity Rules promulgated by the state of Ohio. These Ohio rules essentially mirror the Federal requirements of the Federal General Conformity Rule; however, the most recent revisions to the Federal General Conformity Rule that became final on April 5, 2010 (75 FR 17274) have not been incorporated into the Ohio SIP as of the date of this applicability analysis.

The General Conformity Rule applies to Federal actions in areas that are failing to meet one or more of the Federal air quality standards (designated as nonattainment areas), and/or areas that are subject to attainment maintenance plans (designated as maintenance areas). As noted in Section B.1, the Proposed Action would be located in the Metropolitan Dayton AQCR in Ohio. This AQCR has been designated a maintenance area for O_3 and non-attainment for $PM_{2.5}$. The AQCR is in attainment with NAAQS for each of the other criteria pollutants. This conformity applicability analysis will evaluate the conformity of the Proposed Action emissions of O_3 precursors (NO_x and VOC), direct $PM_{2.5}$, and indirect $PM_{2.5}$ precursors (SO_2 and NO_x) in the affected region. The following subsections describe the General Conformity Rule procedures and criteria, and how they specifically pertain to this conformity analysis.

C.2.2 Exemptions and Applicability

Source Exemptions

The general conformity provisions identify specific Federal actions or portions of actions that are exempt from the conformity procedural requirement, because the USEPA has deemed these actions to conform. These actions include those that must undergo air quality analysis to comply with other statutory requirements; actions that would result in no emission increase or an increase in emissions that is clearly *de minimis*; or actions presumed to conform by the agency through separate rule-making actions. These exemptions include the transfer of ownership of real property under 40 CFR 93.153(c)(2)(xiv and xx), as well as leasing agreements pending environmental restoration under 40 CFR 93.153(c)(2)(xix).

The only source exemption potentially applicable to the USAF's Proposed Action for expanding the NMUSAF at Wright-Patterson AFB is the exemption for major or minor new or modified *stationary* sources, which are subject to permits under OEPA's New Source Review (NSR) program or Prevention of Significant Deterioration (PSD) program (40 CFR 93.153(d)(1)). No new or modified stationary sources associated with this Proposed Action are anticipated to require a permit.

De minimis Emission Levels

In addition to the specific source exemptions identified in the conformity rule, Federal actions might be exempt from the conformity requirements if the action meets the applicability criteria for *de minimis* emission levels. The applicability determination procedures presented in the rule include the following elements:

- Define the applicable emission sources for the Federal action
- Quantify the total direct and indirect emissions of nonattainment pollutants from these sources
- Compare these emission rates against the appropriate *de minimis* emission levels

If the total direct and indirect emissions of nonattainment pollutants reach or exceed these applicability threshold values, a Conformity Determination must be prepared by the Federal agency before undertaking the action.

The conformity rule defines direct and indirect emissions based upon the timing and location of the emissions. "Direct" emissions are those that are caused or initiated by the Federal actions, and occur at the same time and place as the action and are reasonably foreseeable. "Indirect" emissions are those that originate in the same nonattainment or maintenance area, but occur at a different time or place from the Federal action. In addition, the conformity rule limits the scope of indirect emissions to those that are *reasonably foreseeable* by the agency at the time of analysis, and those emissions that the Federal agency can practicably control and maintain control of through its continuing program responsibility.

The definitions of direct and indirect emissions do not distinguish among specific source categories; point, area, and mobile sources are given equal consideration in the conformity requirements. All substantive procedural requirements of the General Conformity Rule apply to the total of the net increases and decreases in direct and indirect emissions resulting from the action.

If the total of direct and indirect emissions from the action meet or exceed the *de minimis*, the agency must perform a conformity determination to demonstrate the positive conformity of the Federal action. The *de minimis* emission levels vary by the criteria pollutant and the severity of the region's nonattainment conditions.

Section C.3 presents the specific emission thresholds and the applicability analysis results for the USAF's Proposed Action to expand the NMUSAF at Wright-Patterson AFB.

C.2.3 CAA General Conformity Criteria

If the Proposed Action is not exempt from the conformity demonstration requirements, the General Conformity Rule defines conformity and provides five basic criteria to determine whether a Federal action conforms to an applicable SIP. These criteria assess conformity based upon emission analyses and/or dispersion modeling for the nonattainment pollutants. If the Federal action meets the conformity criteria and requirements, the action is demonstrated to conform to the applicable SIP. If the action cannot meet the criteria and requirements, the agency must develop an enforceable implementation plan to mitigate effectively (e.g., completely offset) the increased emissions from the Proposed Action to meet the conformity requirements. The Federal action cannot proceed unless positive conformity can be demonstrated.

The General Conformity Rule provides the option to select any one of several criteria to analyze the conformity of the Proposed Action. Presented in 40 CFR 93.158, the criteria are primarily based upon the type of pollutant and the status of the applicable SIP. If the applicability analysis concludes that further conformity analyses are required to demonstrate positive conformity (i.e., *de minimis* thresholds are exceeded) the following conformity criteria (paraphrased below) can be used to demonstrate conformity for a proposed action in a nonattainment area:

- The total direct and indirect emissions for the Proposed Action are specifically identified and accounted for in the applicable SIP's attainment or maintenance demonstration. [40 CFR 93.158(a)(1)].
- The total direct and indirect emissions of O_3 precursors are fully offset within the same nonattainment or maintenance area through a revision to the applicable SIP or a similarly enforceable measure so that there is a no net increase in emissions [40 CFR 93.158(a)(2)].
- The State has made a revision to the area's attainment or maintenance demonstration after 1990 and the State either:

- Determines and documents that the action, together with all other emissions in the nonattainment (or maintenance) area, *would not* exceed the emissions budget specified in the applicable SIP.
- Determines that the action, together with all other emissions in the nonattainment (or maintenance) area, *would* exceed the emissions budget specified in the applicable SIP but the State's Governor or designee for SIP actions makes a written commitment to the USEPA to demonstrate CAA conformity through specific measures and scheduled actions [40 CFR 93.158(a)(5)(i)(A & B)].

- The Federal action fully offsets its entire emissions within the same nonattainment area through a revision to the SIP or a similar measure so that there is no net increase in nonattainment pollutant emissions [40 CFR 93.158(a)(5)(iii)].
- The State has not made a revision to the approved SIP since 1990, and the total emissions from the action do not increase emissions above the baseline emissions which are either:
  - Calendar Year 1990 (CY 90) emissions or another calendar year that was the basis for the nonattainment area designation) [40 CFR 93.158(a)(5)(iv)(A)].
  - Historic activity levels and emissions calculated for future years using appropriate emission factors and methods for future years.
- Dispersion modeling analysis demonstrates that direct and indirect emissions from the Federal action will not cause or contribute to violations of Federal ambient air quality standards [40 CFR 93.158(b)].

The USEPA revised the general conformity regulation on April 5, 2010 (USEPA 2010). One of the changes to the regulation relates to the determination of regional significant action. The USEPA deleted the provision of the then existing regulation (40 CFR 93.153) that requires Federal agencies to conduct conformity determinations for regional significant actions where the direct and indirect emissions of any pollutant represent 10 percent or more of a nonattainment or maintenance area's emission inventory for that pollutant. It applied even though the total direct and indirect emissions from the actions are below the *de minimis* emission levels or the actions are otherwise "presumed to conform." The OEPA is revising its general conformity rule to be consistent with the revised Federal regulation (USEPA 2010c; OEPA 2012).

C.2.4 Other State Implementation Plan Consistency Requirements

The conformity analysis must also demonstrate that total direct and indirect emissions from the Proposed Action will be consistent with the applicable SIP requirements and milestones, including:

- Reasonable further progress schedules
- Assumptions specified in the attainment or maintenance demonstration
- SIP prohibitions, numerical emissions limits, and work practice requirements

C.3. APPLICABILITY ANALYSIS

This section of the conformity analysis describes the applicability analysis of the proposed expansion of the NMUSAF at Wright-Patterson AFB to the General Conformity Rule requirements.

C.3.1 Sources Included in the Conformity Analysis

In accordance with the General Conformity Rule, total direct and indirect emissions resulting from proposed Federal action includes several types of stationary and mobile sources. These emissions would occur during construction and anticipated future operations with the Proposed Action. As defined by the rule and applied to the Proposed Action at Wright-Patterson AFB, direct emissions would result from emissions sources not subject to air permitting. Examples of direct emissions sources include construction activities, such as site excavation, building erection, and surface coating activities. Indirect pollutant emissions for the proposed project include activities that the USAF can control as part of the Federal action and include government-owned vehicles (GOVs) and privately-owned vehicles (POVs), and various military support activities at the base.

C.3.2 Total Direct and Indirect Emission Calculations

The detailed estimates of the changes in nonattainment and maintenance area pollutant emissions that would result from implementation of the Proposed Action at Wright-Patterson AFB are presented in the attachment of this Appendix. These calculations are based on very conservative construction activity estimates derived from design/build pre-bid documents, and staffing requirements anticipated annually for full implementation of the NMUSAF expansion. The design/build contract is anticipated to have an eighteen-month duration and museum operational changes begin thereafter. In order to prepare the most conservative emission estimates, these calculations assume that all construction will be completed within one year, and operations will commence the next year and each year following. The resulting analyses indicate that the majority of the first year potential pollutant impacts would result from three elements of the Proposed Action: (1) construction activities, (2) surface coating, and (3) vehicular traffic emissions from commuter motor vehicles and truck material deliveries. The changes in direct and indirect VOC, NO_x, $PM_{2.5}$, and SO_2 emissions from these elements of the Proposed Action are presented below.

Construction Activities

The three main structures proposed for construction include Hangar 4, a connector to the existing Hangar 3, and two concrete reinforced tow lanes. Additionally, a temporary construction material laydown and staging area will be constructed of gravel adjacent to the construction site. This

temporary laydown area will be fully restored to its former state at the end of the project. The exact phasing of the project will be determined by the design/build contractor. For the purpose of this analysis, standard construction equipment sizes and an estimate of the total annual operational hours for each equipment type were estimated combining together the mobilization, excavation, erection, finishing, and demobilization stages. Additionally, emissions from the concrete trucks are included in this subcategory due to the extended onsite idling emissions that occur during pours. Also included are emissions from the aircraft tug that will be used for the initial transport of museum artifacts during the final phase of the project. Criteria pollutants are emitted from the equipment engine exhaust and particulate matter is emitted as fugitive dust from excavating activities and the movement of material and equipment.

Table C-2 presents the estimated annual emissions of the nonattainment and maintenance area pollutants generated during renovation activities at Wright-Patterson AFB. These emissions only occur during the first year of the Proposed Action and are not recurring for future years.

Table C-2. Construction Activity Emissions Associated with the Proposed Action at Wright-Patterson AFB

Construction Activity Emission Type	VOC (tpy)	NO_x (tpy)	$PM_{2.5}$ (tpy)	SO_2 (tpy)
Equipment Exhaust	2.48	33.29	1.94	2.40
Fugitive Surface Dust	0.00	0.00	13.46	0.00

tpy: tons per year

Surface Coating

The surface coating activities of the Proposed Action includes surface painting of structural components and interior walls and partitions; and water-proof sealing of all concrete surfaces. Ohio regulations OAC Rule 3745-113 for Architectural and Industrial Maintenance (AIM) Coatings places maximum VOC content limitations on most types of coatings sold, manufactured, or used in the State. For the purposes of this analysis, the maximum allowable VOC content for each type of coating defined by this AIM rule was used to provide the most conservative estimate of emissions. The Proposed Action calls for all structural components to be painted black or dark gray and the concrete surfaces to be sealed. The exterior shell will be pre-finished, therefore, only onsite construction activities requiring coating are evaluated. The Proposed Action makes no changes to the existing surface coating activities used on aircraft and artifact restoration and does not increase the number of aircraft anticipated for restoration.

Table C-3 presents estimated annual potential surface coating emissions of nonattainment and maintenance area pollutants as a result of the Proposed Action. Because the statutory VOC coating content limitations are used in the calculations, these emissions represent the maximum worst case VOC emissions potential for the Proposed Action given the coverage area assumptions. These emissions only occur during the first year of the Proposed Action and are not recurring for future years.

Table C-3. Surface Coating Emissions Associated with the Proposed Action at Wright-Patterson AFB

Surface Coating Activity	VOC (tpy)	NO_x (tpy)	$PM_{2.5}$ (tpy)	SO_2 (tpy)
Structures and Logos	77.49	0.00	0.00	0.00
Concrete Sealers	6.25	0.00	0.00	0.00

tpy: tons per year

Vehicular Traffic Emissions

Vehicular traffic emissions include emissions associated with construction worker commuting and truck emissions required for construction material and equipment deliveries. Estimates for the number of workers and material deliveries are based on engineering judgment and presumed to be conservatively high. Vehicular emissions are broken into two categories including engine exhaust emissions and roadway fugitive dust emissions. Criteria pollutants are emitted from the engine exhaust and particulate matter is emitted as fugitive dust from roadway debris, tire wear, and brake wear.

Table C-4 below lists the projected nonattainment and maintenance area pollutant emissions for motor vehicle and roadway surface emissions under the Proposed Action. These emissions only occur during the first year of the Proposed Action and are not recurring for future years.

Table C-4. Vehicular Traffic Emissions Associated with the Proposed Action at Wright-Patterson AFB

Alternative	VOC (tpy)	NO_x (tpy)	$PM_{2.5}$ (tpy)	SO_2 (tpy)
Construction Commuting	0.08	0.38	0.009	0.006
Construction Deliveries	0.02	0.23	0.012	0.0004
Fugitive Roadway Dust	0.00	0.00	4.34	0.00

tpy: tons per year

Recurring Museum Operations Emissions

The Proposed Action identifies that up to four additional full-time personnel may be added to support the new addition. Also, the volunteer staff may expand by as much as 150 people. With the relocation of the Presidential Collection from a secured part of the base to new addition, the existing shuttle bus service that currently makes four trips per operating day will be eliminated. No other changes to museum operations are identified in the Proposed Action. Emissions increases include commuter vehicular emissions associated with new workers and volunteers. Emissions decreases include transit bus emissions associated with the shuttle bus service elimination. Vehicular emissions are broken into two categories including engine exhaust emissions and roadway fugitive dust emissions. Criteria pollutants are emitted from the engine exhaust and particulate matter is emitted as fugitive dust from roadway debris, tire wear and brake wear.

Table C-5 below lists the projected nonattainment and maintenance area pollutant emissions for motor vehicle and roadway surface emissions under the Proposed Action. These emissions changes begin during the second year of the Proposed Action and are recurring for future years.

Table C-5. Recurring Museum Operations Emissions Associated with the Proposed Action at Wright-Patterson AFB

Museum Operation Activity	VOC (tpy)	NO_x (tpy)	$PM_{2.5}$ (tpy)	SO_2 (tpy)
Employee/Volunteer Commuting	0.03	0.14	0.004	0.002
Commuting Fugitive Roadway Dust	0.00	0.00	0.84	0.000
(Less) Shuttle Bus Service	0.003	0.05	0.003	0.00005
(Less) Shuttle Bus Fugitive Roadway Dust	0.00	0.00	0.07	0.000

tpy: tons per year

C.3.3 Applicability Analysis Results

Wright-Patterson AFB Operations

Table C-6 sums the Proposed Action total net emissions changes from **Tables C-2 through C-5** above, and compares those impacts to the applicable General Conformity *de minimis* thresholds. The results of the applicability analysis indicate that total cumulative peak year direct and indirect emissions at Wright-Patterson AFB (i.e., Year 1 temporary construction, Year 2+ museum operations) within the Metropolitan Dayton Intrastate AQCR would *not* exceed the 100 tpy *de minimis* for any of the criteria pollutants of concern. Therefore, State and Federal General

Conformity rules are not applicable, and no conformity determination is required for this Proposed Action.

Table C-6. Nitrogen Oxides (NO_x), Volatile Organic Compounds (VOC), Fine Particulate Matter ($PM_{2.5}$), and Sulfur Dioxide (SO_2) Emissions – Comparison to Conformity *de minimis* Thresholds for Metropolitan Dayton Intrastate Air Quality Control Region

Criteria Pollutant	Ozone Attainment Status [1]	*de minimis* Threshold (tpy)	Year 1 Emissions Net Change [2] (tpy)	Year 2 Emissions Net Change [2] (tpy)
NO_x (as O_3 precursor)	Maintenance	100	33.91	0.09
VOC	Maintenance	100	86.32	0.03
$PM_{2.5}$	Nonattainment	100	19.76	0.77
SO_2(as $PM_{2.5}$ precursor)	Nonattainment	100	2.41	0.002
NO_x(as $PM_{2.5}$ precursor)	Nonattainment	100	33.91	0.09

[1] There are no NO_x (NO_2) or SO_2 nonattainment areas at this time. The *de minimis* threshold for NO_x and SO_2 emissions is defined by the ozone and $PM_{2.5}$ attainment statuses respectively.

[2] Net emissions change corresponds to the construction activities in Year 1 and Museum operational changes in Year 2. Year 2 emissions for all pollutants of concern will be recurring.

tpy: tons per year

C.4. CONFORMITY ANALYSIS AND RESULTS

This section presents the conclusion of the conformity analysis for the proposed addition to the NMUSAF at Wright-Patterson AFB. The purpose of this analysis is to determine whether the USAF's Proposed Action at Wright-Patterson AFB would conform to the applicable SIP, based upon the criteria established in the General Conformity Rule and promulgated in 40 CFR 93.158.

The regulatory basis and specific criteria for this analysis were presented in Section C.2 above. This Section C.4 presents the results of the conformity analysis for the following criterion:

> *A Conformity Determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal Action would equal or exceed any of the (de minimis) rates.[40 CFR, 93.153(b)]*

This criterion is shown to be satisfied by the information presented in Section C.3, **Tables C-2** through **C-6**. That is, the reasonably foreseeable project emissions of NO_2, VOC, $PM_{2.5}$, and SO_2 would not exceed the General Conformity Rule *de minimis* levels. This conclusion is supported by the calculations attached to this analysis.

Based upon the conformity analyses results summarized in the previous sections, the proposed Federal action at Wright-Patterson AFB has been shown to meet the conformity criteria for consistency with the Ohio SIP requirements. The proposed Federal actions are therefore consistent with the objectives as set forth in Section 176(c) of the CAA, as amended, and its implementing regulation, 40 CFR Part 93, Subpart B, Determining Conformity of General Federal Actions to State and Local Implementation Plans, and said actions conform to the applicable SIP in accordance with the law.

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Museum of the U.S. Air Force Addition	Total Emissions by Activity (tons/yr)						
Building Construction - Year 1	NOx	VOC	CO	PM	PM-10	PM-2.5	SO2
Construction Commuting	0.38	0.08	2.79	0.010	0.010	0.009	0.006
Construction Material Deliveries	0.234	0.018	0.08	0.013	0.013	0.012	0.0004
Roadway Surface Emissions	0.00	0.000	0.00	88.251	17.674	4.339	0.0000
Construction Equipment	33.29	2.48	18.30	2.01	2.01	1.94	2.40
Construction Activity Fugitive Surface Emissions	0.00	0.00	0.00	53.83	53.83	13.46	0.00
Surface Coating	0.00	83.74	0.00	0.00	0.00	0.00	0.00
Proposed Action Temporary Emissions Total	33.91	86.32	21.17	144.11	73.54	19.76	2.41
Building Operation - Year 2 and Beyond	NOx	VOC	CO	PM	PM-10	PM-2.5	SO2
AF Personnel and Volunteer Commuting	0.14	0.03	1.04	0.004	0.004	0.003	0.002
AF Personnel and Volunteer Roadway Emissions	0.00	0.00	0.00	17.108	3.429	0.842	0.000
(Less) Discontinued Shuttle bus Service	0.050	0.003	0.017	0.003	0.003	0.003	0.000
(Less) Discontinued Shuttle bus Service Roadway Emissions	0.000	0.000	0.000	1.461	0.293	0.072	0.000
Proposed Action Recurring (Net) Emissions Total	0.09	0.03	1.03	15.65	3.14	0.77	0.002

Step 1 Estimate the Vehicle Miles Traveled (VMT) by Vehicle Class

For this analysis, it is assumed that the commuter fleet corresponding to the construction workers will reflect the passenger vehicle fleet on the roads in the vicinity of Wright-Patterson AFB. The passenger car VMT data for Montgomery County, Ohio, were derived from the US EPA Mobile Source MOVES 2010b Model for Calendar Year 2013, Montgomery County Ohio

The following average construction worker counts have been assumed for this analysis:

Area Description	Number of Workers	Working Days
Proposed Action		
New Museum Building		
Museum Building and Footer	70	250
2- Tow Lanes	10	20
Building Connector Floor and Footer	20	250
Total	**100**	

Montgomery County Passenger Vehicle VMT Mix

VClassId	VMT	Vehicle Class	Fuel Type	Mix
11	18,309,101	Motorcycle	Gasoline	0.56%
21	2,162,006,770	Passenger Car	Gasoline	65.58%
31	1,087,973,006	Passenger Truck	Gasoline	33.00%
11	0	Motorcycle	Diesel	0.00%
21	7,097,407	Passenger Car	Diesel	0.22%
31	21,605,085	Passenger Truck	Diesel	0.66%
Total (mi/yr)	**3,296,991,369**			**100.00%**

Source for VMT Mix: MOVES2010b for Montgomery County Ohio, 2013 Calendar Year

Assumptions Used To Estimate Mileage

1	Riders per vehicle
30	Miles avg. commute round trip
50%	Vehicles do daytime errands/lunch
10	Miles avg. errand/lunch round trip

Montgomery County Truck Vehicle VMT Mix

VClassId	VMT	Vehicle Class	Fuel Type	Mix
52	56,701,740	Single Unit Short-haul Truck	Diesel	63.63%
61	32,412,621	Combination Short-haul Truck	Diesel	36.37%
Total (mi/yr)	**89,114,361**			**100.00%**

Assumptions Used To Estimate Mileage

3	Delivery Trucks per Day
40	Miles avg. delivery round trip
260	Total Work Days

Step 2 Select the Appropriate Air Pollutant Emission Factors (grams per mile) for the POV Fleet

Emission Factors

Emission factors are taken from the U.S. EPA MOVES2010b emissions model, as compiled for 2013 Calendar Year

All vehicle emissions are calculated assuming a weighted average by distance traveled of all possible model years.

Note that PM10 and PM 2.5 emission factors include exhaust emissions only. Fugitive emissions (paved road, brake & tire dust, etc.) are included with roadway emissions.

Emission Factors in g/mi from MOVES2010b for all Model Year Vehicles in Montgomery County Ohio CY2013.

	Moves2010b Montgomery County g/mi - 2013					
	NOx	VOC	CO	SO2	PM10	PM2.5
(11) Gasoline	0.59	0.98	14.86	0.006	0.036	0.034
(21) Gasoline	0.28	0.05	2.40	0.006	0.008	0.008
(31) Gasoline	0.69	0.14	4.60	0.008	0.013	0.012
(11) Diesel	N/A	N/A	N/A	N/A	N/A	N/A
(21) Diesel	0.72	0.03	0.49	0.003	0.019	0.019
(31) Diesel	2.92	0.41	2.04	0.006	0.178	0.172
(52) Diesel	4.60	0.50	1.74	0.009	0.228	0.221
(61) Diesel	10.68	0.59	3.02	0.017	0.622	0.604

Step 3 Multiply the Emission Factors Times the Annual Vehicle Miles Traveled for Each Vehicle Class

New Museum Building	Museum Building and Footer					
	Construction Commute Emissions by Vehicle Class (tons/yr)					
	NOx	VOC	CO	SO2	PM10	PM2.5
(11) Gasoline	2.20E-03	3.66E-03	5.57E-02	2.07E-05	1.37E-04	1.26E-04
(21) Gasoline	1.25E-01	2.23E-02	1.06E+00	2.60E-03	3.71E-03	3.41E-03
(31) Gasoline	1.54E-01	3.09E-02	1.02E+00	1.76E-03	2.94E-03	2.71E-03
(11) Diesel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
(21) Diesel	1.04E-03	4.72E-05	7.07E-04	4.65E-06	2.81E-05	2.72E-05
(31) Diesel	1.29E-02	1.80E-03	9.03E-03	2.52E-05	7.86E-04	7.62E-04
Total	**2.95E-01**	**5.87E-02**	**2.15E+00**	**4.41E-03**	**7.60E-03**	**7.04E-03**

New Museum Building	2- Tow Lanes					
	Construction Commute Emissions by Vehicle Class (tons/yr)					
	NOx	VOC	CO	SO2	PM10	PM2.5
(11) Gasoline	2.51E-05	4.19E-05	6.37E-04	2.36E-07	1.56E-06	1.44E-06
(21) Gasoline	1.43E-03	2.55E-04	1.21E-02	2.97E-05	4.24E-05	3.90E-05
(31) Gasoline	1.76E-03	3.54E-04	1.17E-02	2.01E-05	3.36E-05	3.09E-05
(11) Diesel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
(21) Diesel	1.19E-05	5.39E-07	8.07E-06	5.32E-08	3.21E-07	3.11E-07
(31) Diesel	1.48E-04	2.06E-05	1.03E-04	2.88E-07	8.98E-06	8.71E-06
Total	**3.38E-03**	**6.71E-04**	**2.46E-02**	**5.04E-05**	**8.68E-05**	**8.04E-05**

New Museum Building	Building Connector Floor and Footer					
	Construction Commute Emissions by Vehicle Class (tons/yr)					
	NOx	VOC	CO	SO2	PM10	PM2.5
(11) Gasoline	6.28E-04	1.05E-03	1.59E-02	5.91E-06	3.91E-05	3.60E-05
(21) Gasoline	3.57E-02	6.36E-03	3.03E-01	7.43E-04	1.06E-03	9.75E-04
(31) Gasoline	4.41E-02	8.84E-03	2.93E-01	5.03E-04	8.40E-04	7.74E-04
(11) Diesel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
(21) Diesel	2.97E-04	1.35E-05	2.02E-04	1.33E-06	8.03E-06	7.79E-06
(31) Diesel	3.69E-03	5.14E-04	2.58E-03	7.19E-06	2.24E-04	2.18E-04
Total	**8.44E-02**	**1.68E-02**	**6.14E-01**	**1.26E-03**	**2.17E-03**	**2.01E-03**

Proposed Action	Total Emissions Construction Commuting					
	Construction Commute Emissions by Vehicle Class (tons/yr)					
	NOx	VOC	CO	SO2	PM10	PM2.5
Total	**0.383**	**0.076**	**2.789**	**0.006**	**0.010**	**0.009**

New Museum Building	Construction Material Delivery Trucks					
	Construction Material Delivery Truck Emissions by Vehicle Class (tons/yr)					
	NOx	VOC	CO	SO2	PM10	PM2.5
(52) Diesel	1.01E-01	1.10E-02	3.81E-02	2.01E-04	4.99E-03	4.84E-03
(61) Diesel	1.34E-01	7.35E-03	3.78E-02	2.18E-04	7.78E-03	7.55E-03
Total	**0.234**	**0.018**	**0.076**	**0.000**	**0.013**	**0.012**

Step 1 Estimate the Vehicle Miles Traveled (VMT) by Vehicle Class

For this analysis, it is assumed that the commuter fleet corresponding to the construction workers will reflect the passenger vehicle fleet on the roads in the vicinity of Wright-Patterson AFB. The passenger vehicle VMT data for Montgomery County, Ohio, were derived from the US EPA Mobile Source MOVES 2010b Model for Calendar Year 2013, Montgomery County Ohio

The following average construction worker counts have been assumed for this analysis:

Area Description	Number of Personnel	Work Days
Proposed Action		
New Museum Building Operations		
Increase in Permanent Employees	4	250
Increase in Volunteers	150	50
Total	**154**	

Montgomery County Passenger Vehicle VMT Mix

VClassId	VMT	Vehicle Class	Fuel Type	Mix
11	18,309,101	Motorcycle	Gasoline	0.56%
21	2,162,006,770	Passenger Car	Gasoline	65.58%
31	1,087,973,006	Passenger Truck	Gasoline	33.00%
11	0	Motorcycle	Diesel	0.00%
21	7,097,407	Passenger Car	Diesel	0.22%
31	21,605,085	Passenger Truck	Diesel	0.66%
Total (mi/yr)	**3,296,991,369**			**100.00%**

Source for VMT Mix: MOVES2010b for Montgomery County Ohio, 2013 Calendar Year

Assumptions Used To Estimate Mileage

1	Riders per vehicle
30	Miles avg. commute round trip
50%	Vehicles do daytime errands/lunch
10	Miles avg. errand/lunch round trip

Montgomery County Transit Bus VMT Mix

VClassId	VMT	Vehicle Class	Fuel Type	Mix
42	721,698	Transit Bus	Diesel	100.00%
Total (mi/yr)	**721,698**			**100.00%**

Assumptions Used To Estimate Mileage

4	Shuttle Bus Trips per Day
3.4	Miles avg. shuttle round trip
362	Total Operational Days

Step 2 Select the Appropriate Air Pollutant Emission Factors (grams per mile) for the POV Fleet

Emission Factors

Emission factors are taken from the U.S. EPA MOVES2010b emissions model, as compiled for 2013 Calendar Year

All vehicle emissions are calculated assuming a weighted average by distance traveled of all possible model years.

Note that PM10 and PM 2.5 emission factors include exhaust emissions only. Fugitive emissions (paved road, brake & tire dust, etc.) are included with roadway emissions.

Emission Factors in g/mi from MOVES2010b for all Model Year Vehicles in Montgomery County Ohio CY2013.

	Moves2010b Montgomery County g/mi - 2013					
	NOx	VOC	CO	SO2	PM10	PM2.5
(11) Gasoline	0.59	0.98	14.86	0.006	0.036	0.034
(21) Gasoline	0.28	0.05	2.40	0.006	0.008	0.008
(31) Gasoline	0.69	0.14	4.60	0.008	0.013	0.012
(11) Diesel	N/A	N/A	N/A	N/A	N/A	N/A
(21) Diesel	0.72	0.03	0.49	0.003	0.019	0.019
(31) Diesel	2.92	0.41	2.04	0.006	0.178	0.172
(42) Diesel	9.14	0.62	3.12	0.009	0.477	0.463

Step 3 Multiply the Emission Factors Times the Annual Vehicle Miles Traveled for Each Vehicle Class

New Museum Building Operations	**Increase in Permanent Employees**					
	Personnel Commute Emissions by Vehicle Class (tons/yr)					
	NOx	VOC	CO	SO2	PM10	PM2.5
(11) Gasoline	1.26E-04	2.09E-04	3.18E-03	1.18E-06	7.82E-06	7.20E-06
(21) Gasoline	7.15E-03	1.27E-03	6.06E-02	1.49E-04	2.12E-04	1.95E-04
(31) Gasoline	8.81E-03	1.77E-03	5.85E-02	1.01E-04	1.68E-04	1.55E-04
(11) Diesel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
(21) Diesel	5.95E-05	2.70E-06	4.04E-05	2.66E-07	1.61E-06	1.56E-06
(31) Diesel	7.38E-04	1.03E-04	5.16E-04	1.44E-06	4.49E-05	4.35E-05
Total	**1.69E-02**	**3.36E-03**	**1.23E-01**	**2.52E-04**	**4.34E-04**	**4.02E-04**

New Museum Building Operations	**Increase in Volunteers**					
	Personnel Transport Emissions by Vehicle Class (tons/yr)					
	NOx	VOC	CO	SO2	PM10	PM2.5
(11) Gasoline	9.42E-04	1.57E-03	2.39E-02	8.86E-06	5.86E-05	5.40E-05
(21) Gasoline	5.36E-02	9.55E-03	4.55E-01	1.11E-03	1.59E-03	1.46E-03
(31) Gasoline	6.61E-02	1.33E-02	4.39E-01	7.55E-04	1.26E-03	1.16E-03
(11) Diesel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
(21) Diesel	4.46E-04	2.02E-05	3.03E-04	1.99E-06	1.20E-05	1.17E-05
(31) Diesel	5.53E-03	7.71E-04	3.87E-03	1.08E-05	3.37E-04	3.27E-04
Total	**1.27E-01**	**2.52E-02**	**9.22E-01**	**1.89E-03**	**3.26E-03**	**3.02E-03**

Proposed Action	**Total Emissions**					
	Personnel Commute Emissions by Vehicle Class (tons/yr)					
	NOx	VOC	CO	SO2	PM10	PM2.5
Total	**0.144**	**0.029**	**1.044**	**0.002**	**0.004**	**0.0034**

New Museum Building Operations	**Discontinue Shuttle bus Service**					
	Transit Bus Emissions (tons/yr)					
	NOx	VOC	CO	SO2	PM10	PM2.5
(52) Diesel	4.96E-02	3.37E-03	1.69E-02	4.73E-05	2.59E-03	2.51E-03
Total	**0.050**	**0.003**	**0.017**	**0.00005**	**0.003**	**0.003**

ROADWAY SURFACE PARTICULATE EMISSIONS FACTORS

Description of Roadway Scenarios	Brakewear PM-10 Factor lbs/VMT	Brakewear PM-2.5 Factor lbs/VMT	Tirewear PM-10 Factor lbs/VMT	Tirewear PM-2.5 Factor lbs/VMT	k (TSP)	k (PM-10)	k (PM2.5)	sL	W	TSP Emission Factor lbs/VMT	PM-10 Emission Factor lbs/VMT	PM-2.5 Emission Factor lbs/VMT	VMT/yr
New Museum Building Construction (Year 1)													
Construction Commuting	5.434E-05	1.423E-05	1.542E-05	3.698E-06	0.011	0.0022	0.00054	8.2	2	0.14	0.03	0.01	794,500
Construction Material Delivery Trucks	2.895E-04	7.578E-05	4.060E-05	9.735E-06	0.011	0.0022	0.00054	8.2	30	2.17	0.43	0.11	31,200
New Museum Building Operation (Year 2)													
New Personnel Commuting	5.434E-05	1.423E-05	1.542E-05	3.698E-06	0.011	0.0022	0.00054	8.2	2	0.14	0.03	0.01	297,500
(Less) Discontinuance of Shuttle Bus	1.471E-04	3.851E-05	3.066E-05	7.352E-06	0.011	0.0022	0.00054	8.2	10	0.71	0.14	0.03	4,923

ROADWAY SURFACE PARTICULATE EMISSIONS

Description of Roadway Scenarios		Uncontrolled TSP Emissions (lb/yr)	Uncontrolled TSP Emissions (ton/yr)	Control Efficiency (%)	Controlled TSP Emissions (ton/yr)	Uncontrolled PM-10 Emissions (lb/yr)	Uncontrolled PM-10 Emissions (ton/yr)	Control Efficiency (%)	Controlled PM-10 Emissions (ton/yr)	Uncontrolled PM-2.5 Emissions (lb/yr)	Uncontrolled PM-2.5 Emissions (ton/yr)	Control Efficiency (%)	Controlled PM-2.5 Emissions (ton/yr)
New Museum Building Construction (Year 1)													
Construction Commuting		108,780	54.39	16	45.69	21,800	10.90	16	9.16	5,352	2.68	16	2.25
Construction Material Delivery Trucks		67,619	33.81	16	28.40	13,532	6.77	16	5.68	3,322	1.66	16	1.40
Totals		176,399	88.20		74.09	35,332	17.67		14.84	8,673	4.34		3.64
New Museum Building Operation (Year 2)													
New Personnel Commuting		40,733	20.37	16	17.11	8,163	4.08	16	3.43	2,004	1.00	16	0.84
(Less) Discontinuance of Shuttle Bus		3,480	1.74	16	1.46	697	0.35	16	0.29	171	0.09	16	0.07
Totals		37,253	18.63		15.65	7,467	3.73		3.14	1,833	0.92		0.77

Montgomery County Vehicle VMT Mix	Moves2010b Montgomery County g/mi - 2013					Weighted Emission Factors - g/mi			
	Brakewear		Tirewear		Mix	Brakewear		Tirewear	
	PM10	PM2.5	PM10	PM2.5	%	PM10	PM2.5	PM10	PM2.5
(11) Gasoline, Motorcycle	0.0018	0.0005	0.0035	0.0008	0.56%	0.0246	0.0065	0.0070	0.0017
(21) Gasoline, Passenger Car	0.0203	0.0053	0.0070	0.0017	65.58%				
(31) Gasoline, Passenger Truck	0.0336	0.0088	0.0071	0.0017	33.00%				
(11) Diesel, Motorcycle	N/A	N/A	N/A	N/A	0.00%				
(21) Diesel, Passenger Car	0.0203	0.0053	0.0070	0.0017	0.22%				
(31) Diesel, Passenger Truck	0.0319	0.0084	0.0089	0.0021	0.66%				
(52) Diesel, Single Unit Short-Haul Truck	0.1175	0.0307	0.0158	0.0038	63.63%	0.1313	0.0344	0.0184	0.0044
(61) Diesel, Combination Short-Haul Truck	0.1555	0.0407	0.0230	0.0055	36.37%				
(42) Diesel, Transit Bus	0.1555	0.0407	0.0230	0.0055	100.00%	0.0667	0.0175	0.0139	0.0033

NOTES:

Emission estimation equations from AP-42 Section 13.2.1 (11/06), Equation (2) for industrial paved roads. Variable definitions:

k = base emission factor for particle size Particulate Matter/PM30 and PM10

W = average weight (tons) of vehicles traveling the road

sL = road surface silt loading for particle size range of interest (assumed similar to a quarry).

P = number of days with at least 0.01 inches of rain (140 from Figure 13.2.1-2)

N = 365 days per year for annual emissions

Control efficiencies of 16% calculated for all locations due to the majority of road emissions are off-site. (80% control x 20% onsite)

Construction Material Deliveries are assumed to occur three times per day for 52 weeks @ 40 miles round trip.

CONSTRUCTION AREA EMISSIONS

Area Description	Area		Project Duration	Emission Factor	Control Efficiency	Estimated Emissions	Estimated Emissions
	A		T	EM_{FAC}	CE	E_{lb}	E_{TON}
	A = L * W		†2	†3	†4	$E_{TON} = A * T * EM_{FAC}$	$E_{TON} = A * T * EM_{FAC}$
	($ft.^2$)†1	(acre)	(months)	(ton/acre/month)	(%)	(lb)	(ton)
Proposed Action							
New Museum Building Foundation Footprint (321x830)	266,430	6.1	12	1.2	80%	35,235	17.62
Adjacent Laydown Area (Gravel) and Restoration (x2)	532,860	12.2	12	1.2	80%	70,471	35.24
2- Concrete Tow Lanes (600x75 each)	90,000	2.1	1	1.2	80%	992	0.50
Building 3 Connector (195x75)	14,625	0.3	6	1.2	80%	967	0.48
Totals	-	-	-	-	-	PM/PM-10	53.83
						PM-2.5 †5	13.46

LEGEND

†1 Note: Based on estimated footprints for each construction project. Estimates were made from Section 2.3 of the DOPAA

†2 Note: Conservative estimate for Total Project Construction Portion= 52 weeks.

†3 Note: Emission factor Section 13.2.3 "Heavy Construction Operations" (dated 1/95), of AP-42, "Compilation of Air Pollutant Emission Factors", 5th Edition, U.S. EPA, Research Triangle Park, NC, 1998.

†4 Note: Table 2.1.1-3 - "Summary of Techniques, Efficiencies, and Costs for Controlling Fugitive Dust from Paved and Unpaved Surfaces," Fugitive Dust Control Technology Orlemann (1993).

Control efficiency for watering of paved surfaces.

†5 Note: Emission Factor Section 13.2.1-1 "Particle Size Multipliers for Paved Roads", of AP-42, states PM-2.5 to be 25% of PM-10.

CONTRUSTION EQUIPMENT EMISSIONS

Equipment	Load Factor (%)	Operating Hours hours/day	Duration days	HP hp	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr
Diesel Dozer	0.59	8	130	500	0.35	2.04	5.03	0.33	0.32	0.38
Diesel Truck	0.59	8	260	1500	0.29	1.66	5.11	0.26	0.25	0.37
Diesel Crane	0.43	8	520	500	0.38	1.37	5.47	0.29	0.28	0.37
Diesel Excavator	0.59	8	130	150	0.34	1.7	4.55	0.32	0.31	0.38
Diesel Forklifts	0.59	8	520	170	0.41	2.95	4.52	0.41	0.4	0.4
Diesel Welders	0.21	8	260	25	2.32	9.21	6.89	1.39	1.35	0.48
Diesel Generator	0.43	8	260	350	0.84	3.15	6.34	0.61	0.59	0.4
Diesel Air Compressor	0.43	8	260	350	0.59	2.49	5.69	0.49	0.48	0.4
Diesel Aircraft Tractor/Tug	0.59	6	25	68	0.45	3.63	7.72	0.64	0.62	0.38
4-Stroke Surfacing Equipment	0.49	8	80	25	15.92	734.58	2.91	0.14	0.13	0.22
Diesel Paving Equipment	0.59	8	20	150	0.52	2.84	5.3	0.48	0.47	0.39

Notes:

Emission factors from Table 3-1 of Air Emissions Factor Guide for Air Force Mobile Sources, December 2009.

Assumed Values for Operating Hours and specific HP of equipment based on engineering judgment.

Assumed each project construction excavation phase would have a duration of a six month period and construction 6 months based on engineering judgment.

Assumed Duration Days includes the total number of each equipment type used during the project.

Proposed Action, New Construction of Museum Building and Tow Lanes

Equipment	Hours	VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Dozer	1,040	236.73	1,379.79	3,402.13	223.20	216.44	257.02
Diesel Truck	2,080	1,176.88	6,736.61	20,737.41	1,055.13	1,014.55	1,501.53
Diesel Crane	4,160	749.28	2,701.34	10,785.64	571.82	552.10	729.56
Diesel Excavator	1,040	68.99	344.95	923.24	64.93	62.90	77.11
Diesel Forklifts	4,160	377.14	2,713.58	4,157.76	377.14	367.94	367.94
Diesel Welders	2,080	55.85	221.72	165.87	33.46	32.50	11.56
Diesel Generator	2,080	579.70	2,173.89	4,375.38	420.98	407.17	276.05
Diesel Air Compressor	2,080	407.17	1,718.41	3,926.80	338.16	331.26	276.05
Diesel Aircraft Tractor/Tug	150	6.02	48.19	102.40	8.43	8.19	5.04
4-Stroke Surfacing Equipment	640	275.16	12,696.44	50.30	2.42	2.25	3.80
Diesel Paving Equipment	160	16.23	88.66	165.45	14.98	14.67	12.17
Concrete Truck Deliveries	1,785	1,009.84	5,780.46	17,794.05	905.37	870.55	1,288.41
Total Emissions (lb)		**4,959.00**	**36,604.04**	**66,586.43**	**4,016.03**	**3,880.53**	**4,806.25**
Total Emissions (ton)		**2.48**	**18.30**	**33.29**	**2.01**	**1.94**	**2.40**

CONCRETE DELIVERIES

PARTICULATE EMISSIONS

Description of Material Haul Route Scenarios	Brakewear PM-10 Factor lbs/VMT	Brakewear PM-2.5 Factor lbs/VMT	Tirewear PM-10 Factor lbs/VMT	Tirewear PM-2.5 Factor lbs/VMT	k (TSP)	k (PM-10)	k (PM2.5)	sL	W	TSP Emission Factor lbs/VMT	PM-10 Emission Factor lbs/VMT	PM-2.5 Emission Factor lbs/VMT	VMT/yr
Proposed Action													
Museum Building and Footer	2.590E-04	6.780E-05	3.485E-05	8.358E-06	0.011	0.0022	0.00054	8.2	25	1.80	0.36	0.09	13,456
2- Tow Lanes	2.590E-04	6.780E-05	3.485E-05	8.358E-06	0.011	0.0022	0.00054	8.2	25	1.80	0.36	0.09	4,545
Building Connector Floor and Footer	2.590E-04	6.780E-05	3.485E-05	8.358E-06	0.011	0.0022	0.00054	8.2	25	1.80	0.36	0.09	739

Description of Material Haul Route Scenarios		Uncontrolled TSP Emissions		Control Efficiency	Controlled TSP Emissions	Uncontrolled PM-10 Emissions		Control Efficiency	Controlled PM-10 Emissions	Uncontrolled PM-2.5 Emissions		Control Efficiency	Controlled PM-2.5 Emissions
		(lb/yr)	(ton/yr)	(%)	(ton/yr)	(lb/yr)	(ton/yr)	(%)	(ton/yr)	(lb/yr)	(ton/yr)	(%)	(ton/yr)
Proposed Action													
Museum Building and Footer		24,214	12.11	16	10.17	4,846	2.42	16	2.04	1,190	0.59	16	0.50
2- Tow Lanes		8,180	4.09	16	3.44	1,637	0.82	16	0.69	402	0.20	16	0.17
Building Connector Floor and Footer		1,329	0.66	16	0.56	266	0.13	16	0.11	65	0.03	16	0.03
Totals		33,723	16.86		14.16	6,749	3.37		2.83	1,657	0.83		0.70

NOTES:

Emission estimation equations from AP-42 Section 13.2.1 (11/06), Equation (2) for industrial paved roads. Variable definitions:

k = base emission factor for particle size Particulate Matter/PM30 and PM10

W = average weight (tons) of vehicles traveling the road

sL = road surface silt loading for particle size range of interest (assumed similar to a quarry).

P = number of days with at least 0.01 inches of rain (140 from Figure 13.2.1-2)

N = 365 days per year for annual emissions

Control efficiencies of 16% calculated for all locations due to the majority of road emissions are off-site. (80% control x 20% onsite)

Vehicle Miles Traveled (VMT) were estimated as follows:

Proposed Action	Area	Depth	Number	Miles	Avg. Weight	Hours
	($ft.^2$)	(ft)	of Trucks		(lb.)	
Museum Building and Footer	266,430	1.00	897	13,456	50,000	1,282
2- Tow Lanes	90,000	1.00	303	4,545	50,000	433
Building Connector Floor and Footer	14,625	1.00	49	739	50,000	70

Number of Trucks based on average size load of 11 cubic yards of concrete/asphalt from Oshcosh Series-S Spec Sheet

Miles based on Trucks loading at an offsite batch plant and round trip distance of 15.0 miles on average

Hours based on average speed of 35 Mi/hr plus 1 hour per delivery

Depth of Concrete assumed to be minimum of 12 inches from DOPAA for heaviest loading.

Calculation of VOC Emissions Due to Site Surface Coating Activities (Uncontrolled).

Input Parameters and Assumptions

All non-flat paint is restricted to maximum VOC		Concrete Waterproofing Sealant		Contractor Paint	
150	g/L of VOC	400	g/L of VOC	430	g/L of VOC
0.33	lb/L of VOC	0.88	lb/L of VOC	0.95	lb/L of VOC
1.25	lb/gal of VOC	3.34	lb/gal of VOC	3.59	lb/gal of VOC

Proposed Action

Operation	Estimate Surface (ft^2)	Number Count	Total Area (ft^2)	Coats	Coating Coverage (ft^2/gal)	Max. VOC (lb)
Paint Interior Building Structures	9,988,811	1	9,988,811	2	350	71,456.46
Primer Interior Building Structures	9,988,811	1	9,988,811	1	150	83,365.87
Paint Interior Museum Displays (no aircraft)	2700	3	8,100	2	350	57.94
Primer Interior Museum Displays (no aircraft)	2700	3	8,100	1	150	67.60
Exterior Building Logos and Signs	1000	2	2,000	2	350	14.31
Exterior Building Logos and Signs Primer	1000	2	2,000	1	150	16.69
Concrete Water Proofing Sealer (indoors)	281,055	1	281,055	2	200	9,382.66
Concrete Water Proofing Sealer (outdoors)	90,000	1	90,000	2	200	3,004.53
Contractor Marking Paints (outdoors)	5,000	1	5,000	1	150	119.62
		Total Area (ft^2)	10,374,966	14	**Total (lb)**	**167,485.69**
		Total (gal)	127,540		**Total (tons)**	**83.74**

Resources:

Dimensions: Based on estimated footprints for each construction project when available.

Paint Coverage Rate is from Sherwin Williams Product Data Sheet for Surface Coating for interior/exterior latex paint, surface coating of all surface enamel.

Concrete Coverage Rate is from Quikrete Product Data Sheet for Commercial Grade concrete sealer.

Restrictions on VOC content of coatings are based on OAC Rule 3745-113-03, Standards for Architectural and Industrial Maintenance Coatings

Contractor Paint in Aerosol Cans are exempt from OAC Rule 3745-113-03 per OAC Rule 3745-113-02(A)(2). Data above from Krylon MSDS.

5,000 ft^2 area for contractor paint equates to approximately 285 - 15 oz. aerosol cans of fluorescent paint.

Ratios of Steel Dimensions from Chapter 5, *RS Means Estimating Handbook (3rd Edition)*

Assumptions for the Estimate of Interior Building Structures Surface Area

Location	Width or ratio	Length	Height	Surface	Multiplier	Total Area
	(ft) or (ft^2)/length)	(ft)	(ft)	(ft^2)		(ft^2)
Main Building Interior Shell	321	830	N/A	266,430	1	266,430
Main Building Perimeter Walls & Partitions	321	830	18	4,795,740	2	9,591,480
Main Building Arch Trusses (W30 x 260)	9.90	321	N/A	3,178	22	69,914
Main Building Vertical Columns (W14 x 120)	5.90	44	N/A	260	44	11,422
Main Building Cross-Members/Supports	2.00	45	N/A	90	168	15,120
Main Building Misc. Catwalks/Handrails	4.00	400	N/A	1,600	8	12,800
Connector Walls	N/A	195	18	3,510	2	7,020
Connector Ceiling	75	195	N/A	14,625	1	14,625
					Total	**9,988,811**

Appendix D

Noise Terminology and Analysis Methodology

This Appendix presents a detailed discussion of noise and its effects on people and the environment. An assessment of aircraft noise requires a general understanding of how sound is measured and how it affects people in the natural environment. The purpose of this appendix is to address public concerns regarding aircraft noise impacts.

Section D.1 is a general discussion on the properties of noise. Section D.2 summarizes the noise metrics discussed throughout this Environmental Assessment (EA). Section D.3 provides Federal land use compatibility guidelines that are used in applying aircraft noise impacts to land use planning in the airport environment.

D.1 GENERAL

Noise, often defined as unwanted sound, is one of the most common environmental issues associated with aircraft operations. Of course, aircraft are not the only source of noise in an urban or suburban surrounding, where interstate and local roadway traffic, rail, industrial, and neighborhood sources also intrude on the everyday quality of life. Nevertheless, aircraft are readily identifiable to those affected by their noise, and typically are singled out for special attention and criticism. Consequently, aircraft noise problems often dominate analyses of environmental impacts.

Sound is a physical phenomenon, and consists of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Whether that sound is interpreted as pleasant or unpleasant depends largely on the listener's current activity, past experience, and attitude toward the source of that sound. It is often true that one person's music is another person's noise.

The measurement and human perception of sound involves two basic physical characteristics, intensity and frequency. The intensity is a measure of the strength or amplitude of the sound vibrations and is expressed in terms of sound pressure. The higher the sound pressure, the more energy carried by the sound and the louder is the perception of that sound. The second important physical characteristic is sound frequency which is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches.

The loudest sounds which can be detected comfortably by the human ear have intensities which are 1,000,000,000,000 times larger than those of sounds which can just be detected. Because of this vast range, any attempt to represent the intensity of sound using a linear scale becomes very unwieldy. As a result, a logarithmic unit known as the decibel (dB) is used to represent the intensity of a sound. Such a representation is called a sound level.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

$$60 \text{ dB} + 60 \text{ dB} = 63 \text{ dB, and}$$

$$80 \text{ dB} + 80 \text{ dB} = 83 \text{ dB}$$

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

$$60.0 \text{ dB} + 70.0 \text{ dB} = 70.4 \text{ dB}$$

Because the addition of sound levels behaves differently than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that what we are really doing when we add decibel values is first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

An important facet of decibel addition arises later when the concept of time-average sound levels is introduced to explain Day-Night Average Sound Level (DNL). Because of the logarithmic units, the time-average sound level is dominated by the louder levels that occur during the averaging period. As a simple example, consider a sound level which is 100 dB and lasts for 30 seconds, followed by a sound level of 50 dB which also lasts for 30 seconds. The time-average sound level over the total 60-second period is 97 dB, not 75 dB.

A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually pain at still higher levels.

The minimum change in the time-average sound level of individual events which an average human ear can detect is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relation holds true for loud sounds and for quieter sounds.

Sound frequency is pitch measured in terms of hertz (Hz). The normal human ear can detect sounds which range in frequency from about 20 Hz to about 15,000 Hz. All sounds in this wide range of frequencies, however, are not heard equally well by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. To account for the varied frequency sensitivity of people, we use the A-weighted scale that approximates the average, healthy human ear. The A-weighting de-emphasizes the low and high frequency portion of the noise signal and emphasizes the mid-frequency portion. Sound levels measured using A-weighting are most properly called A-weighted sound levels while sound levels measured without any frequency weighting are most properly called sound levels. However, since most environmental impact analysis documents deal only with A-weighted sound levels, the adjective "A-weighted" is often omitted, and A-weighted sound levels are referred to simply as sound levels. In some instances, the author will indicate that the levels have been A-weighted by using the abbreviation dBA or dB(A), rather than the abbreviation dB, for decibel. As long as the use of A-weighting is understood to be used, there is no difference implied by the terms "sound level" and "A-weighted sound level" or by the units dB, dBA, and dB(A). The A-weighting function de-emphasizes higher and especially lower frequencies to which humans are less sensitive. Because the A-weighting is closely related to human hearing characteristics, it is appropriate to use A-weighted sound levels when assessing potential noise effects on humans and many terrestrial wildlife species. In this document, all sound levels are A-weighted and are reported in dB.

Sound levels do not represent instantaneous measurements but rather averages over short periods of time. Two measurement time periods are most common: 1 second and 1/8 of a second. A measured sound level averaged over 1 second is called a slow response sound level; one averaged over 1/8 of a second is called a fast response sound level. Most environmental noise studies use slow response

measurements, and the adjective "slow response" is usually omitted. It is easy to understand why the proper descriptor "slow response A-weighted sound level" is usually shortened to "sound level" in environmental impact analysis documents.

D.2 NOISE METRICS

A "metric" is defined as something "of, involving, or used in measurement." As used in environmental noise analyses, a metric refers to the unit or quantity that measures or represents the effect of noise on people. Noise measurements typically have involved a confusing proliferation of noise metrics as individual researchers have attempted to understand and represent the effects of noise. As a result, past literature describing environmental noise or environmental noise abatement has included many different metrics. Recently, however, various Federal agencies involved in environmental noise mitigation have agreed on common metrics for environmental impact analyses documents, and both the Department of Defense (DOD) and the Federal Aviation Administration (FAA) have specified those which should be used for Federal aviation noise assessments. These metrics are as follows.

D.2.1 Maximum Sound Level

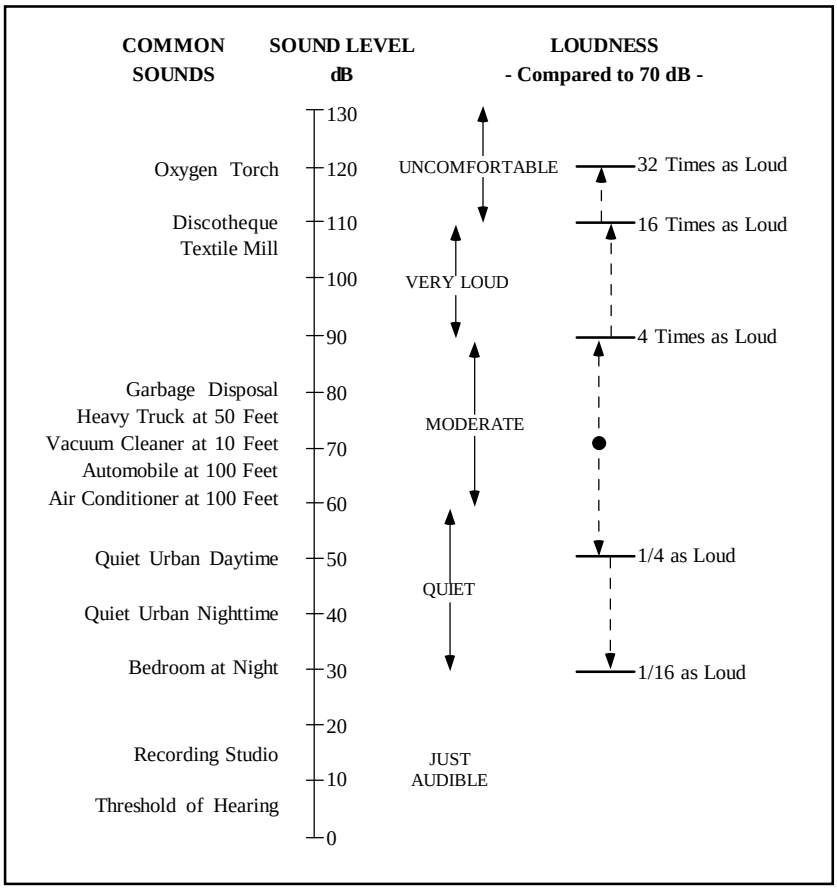
The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. It is usually abbreviated by ALM, L_{max}, or L_{Amax}. The typical A-weighted levels of common sounds are shown in Figure D-1. The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities.

D.2.2 Sound Exposure Level

Individual time-varying noise events have two main characteristics: (1) a sound level which changes throughout the event, and (2) a period of time during which the event is heard. Although the maximum sound level, described above, provides some measure of the intrusiveness of the event, it alone does not completely describe the total event. The period of time during which the sound is heard is also significant. The sound exposure level (abbreviated SEL or LAE) combines both of these characteristics into a single metric.

Sound exposure level is a logarithmic measure of the total acoustic energy transmitted to the listener during the event. Mathematically, it represents the sound level of the constant sound that would, in one second, generate the same acoustic energy as did the actual time-varying noise event. Since aircraft overflights usually last longer than one second, the SEL of an overflight is usually greater than the maximum sound level of the overflight.

Sound exposure level is a composite metric which represents both the intensity of a sound and its duration. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. It has been well established in the scientific community that SEL measures this impact much more reliably than just the maximum sound level. Because the SEL and the maximum sound level are both A-weighted sound levels expressed in dBs, there is sometimes confusion between the two, so the specific metric used should be clearly stated.



Source: Harris 1979

Figure D-1. Typical A-Weighted Sound Levels of Common Sounds

Day-Night Average Sound Level

Time-average sound levels are the measurements of sound levels which are averaged over a specified length of time. These levels provide a measure of the average sound energy during the measurement period.

For the evaluation of community noise effects, and particularly aircraft noise effects, the day-night average sound level (abbreviated DNL or L_{dn}) is used. Day-night average sound level averages aircraft sound levels at a location over a complete 24-hour period, with a 10-dB adjustment added to those noise events which take place between 10:00 p.m. and 7:00 a.m. (local time) the following morning. This 10 dB "penalty" represents the added intrusiveness of sounds which occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours.

Ignoring the 10 dB nighttime adjustment for the moment, DNL may be thought of as the continuous A-weighted sound level which would be present if all of the variations in sound level which occur over a 24-hour period were smoothed out so as to contain the same total sound energy.

DNL provides a single measure of overall noise impact, but does not provide specific information on the number of noise events or the individual sound levels which occur during the day. For example, a DNL of 65 dB could result from a very few noisy events, or a large number of quieter events.

As noted earlier for SEL, DNL does not represent the sound level heard at any particular time, but rather represents the total sound exposure. Scientific studies and social surveys which have been conducted to appraise community annoyance to all types of environmental noise have found the DNL to be the best measure of that annoyance. Its use is endorsed by the scientific community (American National Standards Institute [ANSI] 1980, 1988; U.S. Environmental Protection Agency [USEPA] 1974; Federal Interagency Committee on Urban Noise [FICUN] 1980; Federal Interagency Committee on Noise [FICON] 1992).

There is, in fact, a remarkable consistency in the results of attitudinal surveys about aircraft noise conducted in different countries to find the percentages of groups of people who express various degrees of annoyance when exposed to different levels of DNL. This is illustrated in Figure D-2, which summarizes the results of a large number of social surveys relating community responses to various types of noises, measured in DNL.

Figure D-2 is taken from Schultz (1978) and shows the original curve fit. A more recent study has reaffirmed this relationship (Fidell et al. 1991). Figure D-3 shows an updated form of the curve fit in comparison with the original (Finegold et al. 1992). The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, however, on the order of 0.5 or less. This is not surprising, considering the varying personal factors which influence the manner in which individuals react to noise. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

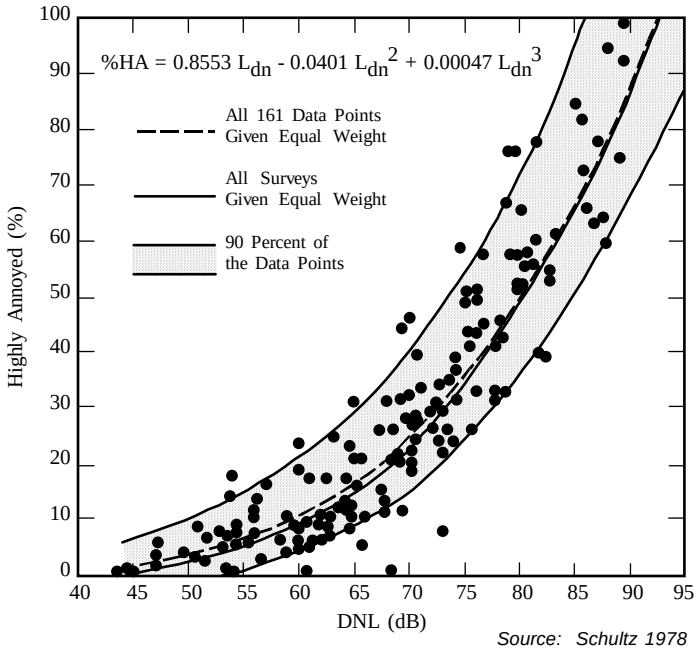
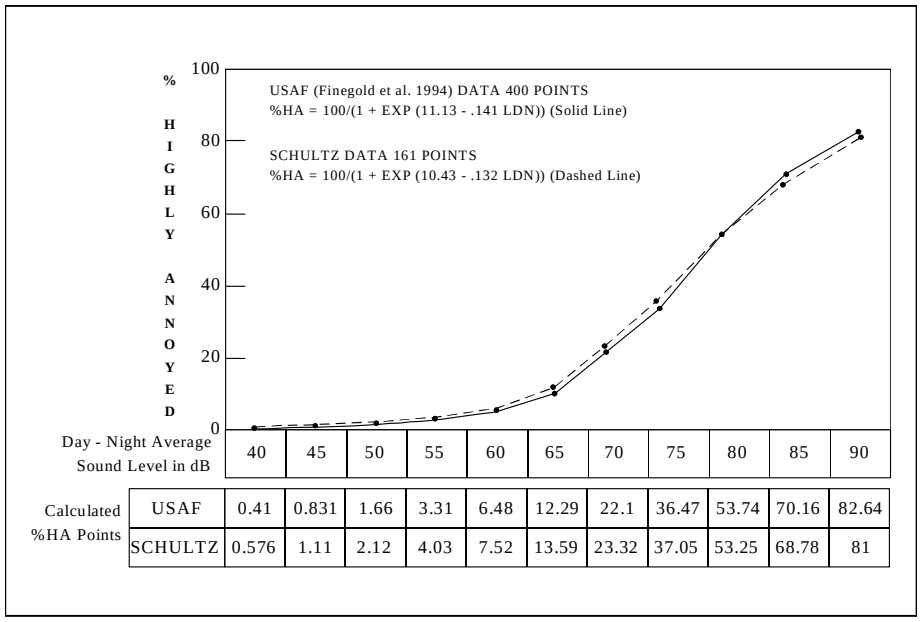


Figure D-2. Community Surveys of Noise Annoyance



Day - Night Average Sound Level in dB		40	45	50	55	60	65	70	75	80	85	90
Calculated %HA Points	USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
	SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

Sources: Schultz 1978 and Finegold et al. 1994

Figure D-3. Response of Communities to Noise and Comparison of Original Schultz 1978 and Current USAF Curve Fits

This relation between community annoyance and time-average sound level has been confirmed, even for infrequent aircraft noise events. A National Aeronautics and Space Administration (NASA) study reported the reactions of individuals in a community to daily helicopter overflights, ranging from 1 to 32 per day (Fields and Powell 1985). The stated reactions to infrequent helicopter overflights correlated quite well with the daily time-average sound levels over this range of numbers of daily noise events.

The use of DNL has been criticized recently as not accurately representing community annoyance and land-use compatibility with aircraft noise. Much of that criticism stems from a lack of understanding of the basis for the measurement or calculation of DNL. One frequent criticism is based on the inherent feeling that people react more to single noise events and not as much to “meaningless” time-average sound levels.

Time-average noise metric, such as DNL, takes into account both the noise levels of all individual events which occur during a 24-hour period and the number of times those events occur. As described briefly above, the logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average.

As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs in daytime during a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.5 dB. Assume, as a second example that 10 such 30-second overflights occur in daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.4 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of events. This is the basic concept of a time-average sound metric, and specifically the DNL.

D.3 LAND-USE COMPATIBILITY

As noted above, the inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. As described above, the best noise exposure metric for this correlation is the DNL. In June 1980, an ad hoc FICUN published guidelines for considering noise in land use planning (FICUN 1980). These guidelines related DNL to compatible land uses in urban areas. The committee was composed of representatives from the DOD, Department of Transportation, Department of Housing and Urban Development; USEPA; and the Veterans Administration. Since the issuance of these guidelines, Federal agencies have generally adopted these guidelines to make recommendations to the local communities on land use compatibilities.

The FAA included the committee's guidelines in the Federal Aviation Regulations (USDOT 1984). These guidelines are reprinted in Table D-1, along with the explanatory notes included in the regulation. Although these guidelines are not mandatory (see Notes in Table D-1), they provide the best means for evaluating noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor DNL (L_{dn} values) above 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions.

In 1990, the FICON was formed to review the manner in which aviation noise effects are assessed and presented. This group released its report in 1992 and reaffirmed the use of DNL as the best metric for this purpose (FICON 1992).

Analyses of aircraft noise impacts and compatible land uses around DOD facilities are normally made using NOISEMAP (Moulton 1992). This computer-based program calculates DNL at many points on the ground around an airfield and draws contours of equal levels for overlay onto land-use maps of the same scale. The program mathematically calculates the DNL of all aircraft operations for a 24-hour period, taking into consideration the number and types of aircraft, their flight paths and engine thrust settings, and the time of day (daytime or nighttime) that each operation occurs.

Day-night average sound levels may also be measured directly around an airfield, rather than calculated with NOISEMAP; however, the direct measurement of annualized DNL is difficult and costly since it requires year-round monitoring or careful seasonal sampling. NOISEMAP provides an accurate projection of aircraft noise around airfields.

NOISEMAP also has the flexibility of calculating sound levels at any specified ground location so that noise levels at representative points under flight paths can be ascertained. NOISEMAP is most accurate for comparing "before and after" noise impacts which would result from proposed airfield changes or alternative noise control actions, so long as the various impacts are calculated in a consistent manner.

Table D-1. Land Use Compatibility Guidelines with Yearly

LAND USE	YEARLY DAY-NIGHT AVERAGE SOUND LEVELS IN DECIBELS					
	BELOW 65	65-70	70-75	75-80	80-85	OVER 85
Residential						
Residential, other than mobile homes and transient lodgings	*Y*	*N(1)*	*N(1)*	*N*	*N*	*N*
Mobile home parks	*Y*	*N*	*N*	*N*	*N*	*N*
Transient lodgings	*Y*	*N(1)*	*N(1)*	*N(1)*	*N*	*N*
Public Use						
Schools	*Y*	*N(1)*	*N(1)*	*N*	*N*	*N*
Hospitals & nursing homes	*Y*	*25*	*30*	*N*	*N*	*N*
Churches, auditoria, & concert halls	*Y*	*25*	*30*	*N*	*N*	*N*
Government services	*Y*	*Y*	*25*	*30*	*N*	*N*
Transportation	*Y*	*Y*	*Y(2)*	*Y(3)*	*Y(4)*	*Y(4)*
Parking	*Y*	*Y*	*Y(2)*	*Y(3)*	*Y(4)*	*N*
Commercial Use						
Offices, business, & professional	*Y*	*Y*	*25*	*30*	*N*	*N*
Wholesale & retail-building materials, hardware, and farm equipment	*Y*	*Y*	*Y(2)*	*Y(3)*	*Y(4)*	*N*
Retail trade-general	*Y*	*Y*	*25*	*30*	*N*	*N*
Utilities	*Y*	*Y*	*Y(2)*	*Y(3)*	*Y(4)*	*N*
Communication	*Y*	*Y*	*25*	*30*	*N*	*N*
Manufacturing and Production						
Manufacturing, general	*Y*	*Y*	*Y(2)*	*Y(3)*	*Y(4)*	*N*
Photographic & optical	*Y*	*Y*	*25*	*30*	*N*	*N*
Agriculture (except livestock) & forestry	*Y*	*Y(6)*	*Y(7)*	*Y(8)*	*Y(8)*	*Y(8)*
Livestock farming & breeding	*Y*	*Y(6)*	*Y(7)*	*N*	*N*	*N*
Mining & fishing, resource production & extraction	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
Recreational						
Outdoor sports arenas & spectator sports	*Y*	*Y(5)*	*Y(5)*	*N*	*N*	*N*
Outdoor music shells, amphitheaters	*Y*	*N*	*N*	*N*	*N*	*N*
Nature exhibits & zoos	*Y*	*Y*	*N*	*N*	*N*	*N*
Amusements, parks, resorts, & camps	*Y*	*Y*	*Y*	*N*	*N*	*N*
Golf courses, riding stables, & water recreation	*Y*	*Y*	*25*	*30*	*N*	*N*

Key:
Y (Yes) = Land use and related structures compatible without restrictions.
N (No) = Land use and related structures are not compatible and should be prohibited.
NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25 or 30 = Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structures.
Notes:
(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor NLR of at least 25 and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB; thus, the reduction requirements often are stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.
(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal level is low.
(5) Land-use compatible, provided special sound reinforcement systems are installed.
(6) Residential buildings require an NLR of 25 dB.
(7) Residential buildings require an NLR of 30 dB.
(8) Residential buildings not permitted.

Source: FAA 1985 and USDOT 1984

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